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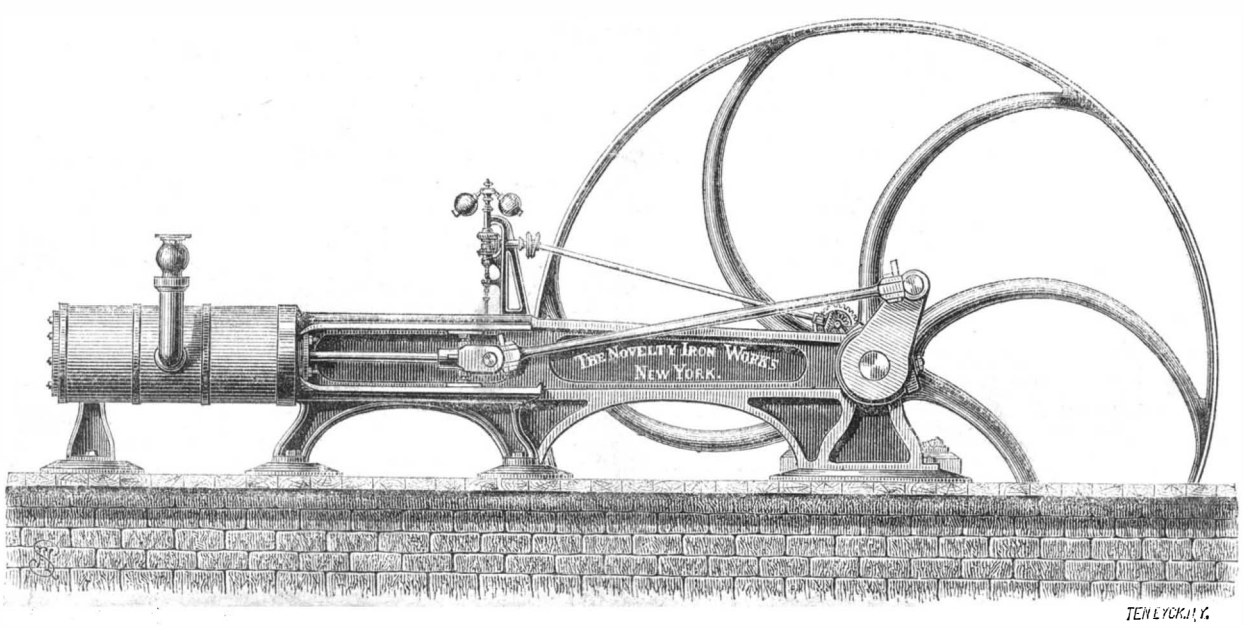
Improvement in Steam Engines.

The engraving represents the non-condensing stationary steam engine manufactured at the Novelty Iron Works, New York city. This large and well-known establishment has resumed the manufacture of stationary steam engines as a specialty. They have at a very considerable expense conducted an extensive series of experiments so as to amend, if necessary, their practice by a positive knowledge of that which is best. They intend soon to publish, for the information of others, the results of these experiments and of their long experience in this particular branch of manufacture.

The name of the Novelty Iron Works is so well and favorably known that it is of itself a sufficient guarantee of the good workmanship and reliable performance of the engine we represent in our columns, in addition to which it presents to the eye a substantial, tasty, and attractive appearance.



STATIONARY STEAM ENGINE.

The bed-plate of the engine is of the style designed many years ago by Mr. Horatio Allen, President of the Novelty Iron Works, and has since been extensively copied by other manufacturers. It may be described as a cast-iron box, attached to which, and forming part of the same casting, are the main guides and strong legs with broad feet—the whole frame being more or less ornamented. One end of the frame also forms a cylinder head, and the other the main pillow block, by which means the reacting pressure on the cylinder is transmitted directly to the shaft by a single structure, in which the greatest weight of metal is disposed directly in the line of the strains, and the construction is such that it is impossible for the cylinder to get out of line. The old style of a bed-plate lies far below the line of direct pressure, and is sprung more or less at every stroke of the engine; besides which, the cylinder, main slides, and pillow block, get out of line, from the fact that they are bolted directly to the top of the bed-plate in such a manner that the joints lie parallel to the line of strain.

The steam is admitted to and from the cylinder by a plain slide valve, so arranged that the cylinder ports are very short and direct, and the amount of steam required to fill the clearance and port is believed to be less than in any other engine manufactured.

The cut-off consists of two plates sliding on the back of the main valve and operated by a separate eccentric. This cut-off is either set at a fixed point, in the usual way, or made so that it can be adjusted by hand, from zero to seven eighths stroke, by simply turning the cut-off valve stem. Preferably, however, the adjustment is made by the governor through a simple arrangement which we will try and make understood without illustrations. The cut-off is varied by drawing together or spreading apart the cut-off plates. To accomplish this by the governor, the plates are operated by separate rods which pass outside the chest and connect to the ends of a small double-ended vertical lever, the center of which receives motion from the cut-off eccentric. The double-ended lever has attached to it a horizontal arm, which is operated to adjust the plates by a vertical movement derived from an adjusting screw on the governor.

The governor is driven by gear in the simple manner shown, so as to be reliable in its action, and is what is ordinarily called a "mill governor." The governor balls have a very slight movement, which simply causes a disk on an adjusting screw to be clutched to the wheels operating the governor in such a manner that the screw is turned in one direction by the engine when the balls rise, and in the other direction when the balls fall—thereby adjusting the plates by the power of the engine the instant the speed changes. The screw stops when the proper speed is restored, and the plates are held by it, in a fixed position, until a further change of speed takes place.

The advantages of this form of governor cut-off are, that it is simple in construction, positive and reliable in its operation, and, unlike any common governor, gives exactly the same speed throughout the full range of power and steam pressure.

For further information address the Novelty Iron Works, foot of East 12th street, New York.

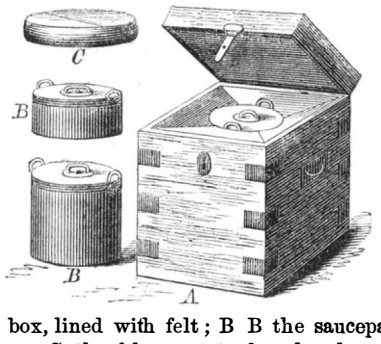
THE SELF-ACTING NORWEGIAN COOKING APPARATUS.

The announcement that the new experiment in co-operative housekeeping now on trial at Salem, Mass., has brought the Norwegian cooking apparatus into use as a means of transporting dinners, "all hot," from the co-operative kitchen to the respective co-operative tables of those who have joined in the experiment, has attracted special notice to this useful implement.

We gave a short notice of this device on page 346, Vol. XIX., but as many of our present readers may not have seen it, and much inquiry is now being made in regard to it, we will, at the risk of repeating ourselves to some extent, give an illustration and a more detailed description of the apparatus.

It is constructed in the most simple manner, of a wooden box lined with four inches of felt, in which the saucepans containing the food, previously boiled and maintained at the boiling point for five or ten minutes, according to the nature of the food to be cooked, are placed. The heated saucepans are covered with a thick felt cover, and, the lid of the box being fastened down, the rest of the cooking is done by slow digestion, no more heat being added.

The heated vessels containing the food will retain a high temperature for several hours, so that a dinner put into the apparatus at eight o'clock in the morning would be quite hot and ready by five in the afternoon, and would keep hot up to ten or twelve at night, because the felt clothing so completely prevents the escape of the heat; and as the whole is inclosed in a box, there are no currents of air to carry off any other heat by convection.



A is the box, lined with felt; B B the saucepans fitting into the box; C the felt cover, to be placed on the top of the saucepans.

The principle on which this cooking apparatus acts is that of retaining the heat; and it consists of a heat-retainer or isolating apparatus, shaped somewhat like a refrigerator, and of one or more saucepans, or other cooking vessels, made to fit into it. Whereas, in the ordinary way of cooking, the fire is necessarily kept up during the whole of the time required for completing the cooking process, the same result is obtained, in using this apparatus, by simply giving the food a start of a few minutes' boiling, the rest of the cooking being completed by itself in the heat-retainer away from the fire altogether.

DIRECTIONS FOR USE.—Put the food intended for cooking, with the water or other fluid *cold*, into the saucepan, and place it on the fire. Make it boil, and when on the point of boiling skim if required. This done, replace the lid of the saucepan firmly, and let it continue boiling for a few minutes. After the expiration of these few minutes, take the saucepan off the fire and place it immediately into the isolating apparatus, cover it carefully with the cushion, and fasten the lid of the apparatus firmly down. In this state the cooking process will complete itself without fail.

By no means let the apparatus be opened during the time required for cooking the food. The length of time which the different dishes should remain in the isolating apparatus varies according to their nature. It may, however, be taken as a general rule that the same time is required to complete the cooking in the apparatus as in the ordinary way on a slow fire.

The advantages of this apparatus are thus detailed by Herr Sörensen, the patentee, whose attention was first directed to the subject by the Norwegian peasants, who heat their food in the morning, and while away in the fields keep the saucepan hot by surrounding it with chopped hay:

1. *Economy of Fuel.*—Varies according to the length of time required for cooking the different sorts of food. For those requiring, in the ordinary way, only one hour's cooking, the saving is about 40 per cent; two hours, 60 per cent; three hours, 65 per cent; six hours, 70 per cent. In the case of gas being used, the saving would be greater still.

2. *Economy of Labor.*—A few minutes' boiling is sufficient. No fire is necessary afterward. The cooking pot once in the apparatus, the cooking will complete itself. Over-cooking is simply impossible, and the process of cooking is infallible in its result. The food will be cooked in about the same time as if fire had been continuously used But the food need not be eaten for many hours after the cooking process is complete; so that half-an-hour's use of a fire on a Saturday night, for example, will give a smoking hot dinner on Sunday.

3. *Portability.*—The weight of the apparatus, complete, varies from 18 to 50 lbs. The apparatus can, in proportion to its dimensions, be carried about with great facility, without interfering with the cooking process. By means of a large apparatus—for instance, following on a cart a detachment of soldiers on the march—it is possible to provide them with a hot meal at any moment it might be found convenient (as may be proved by official reports from the officers of the Royal Guard at Stockholm, in the possession of the patentee).

Again, fishermen, pilots, and others whose small vessels are not generally so constructed as to enable them to procure hot food while at sea, may easily do so by taking out with them in the morning an apparatus prepared before their departure. It is, in short, a thing for the million, for rich and poor; for the domestic kitchen, as well as for persons away from their homes. It cooks and keeps food hot, just as well when carried about on a pack-saddle, on a cart, or in a fisherman's boat, as in a coal-pit or under the kitchen table.

4. *Quality and Quantity of the Food Prepared.*—Where other plans of cooking waste one pound of meat, this apparatus, properly used, wastes about one ounce. The unanimous testimony of those who have used it pronounces the flavor of food cooked in this manner incomparably superior to that which is ordinarily produced.

5. *Simplicity of Use.*—One of the greatest advantages of this invention is, no doubt, its simplicity and practical application. There is no complication of hot-water or air pipes to retain the heat, no mechanical combination whatever for producing a high degree of heat by steam pressure; consequently there is no necessity for steam valves or other combinations which would render the use of the apparatus difficult and dangerous. Any person will, without difficulty, be able to use the apparatus to advantage after once having witnessed it in operation. No special arrangement is required in the kitchen for using the apparatus. Any fuel will do for starting the cooking.

6. In addition to all these advantages, the complete apparatus constitutes the "Simple Refrigerator" for the preservation of ice, which has attracted so much notice, and had such warm approval from medical men. It will keep ice in small quantities for many days.

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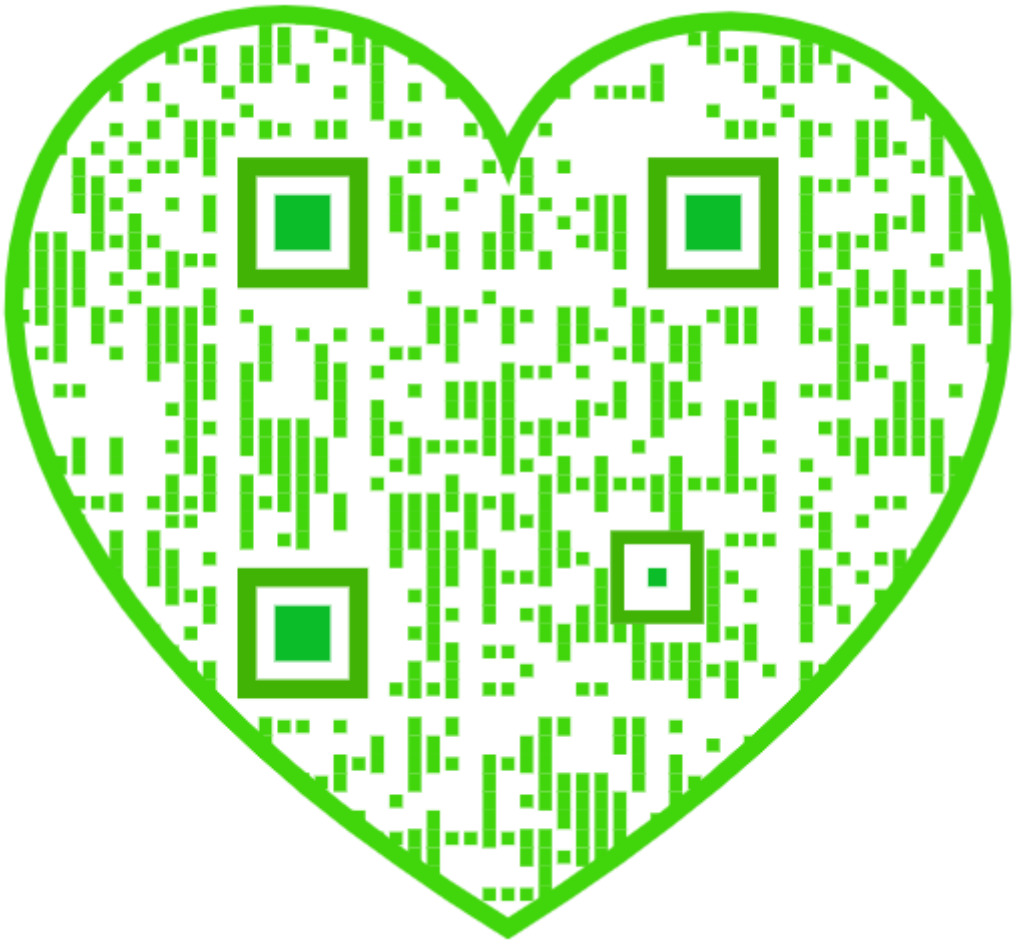

THE SCIENCE ASSOCIATION.

CLASSIFICATION OF THE ELEMENTS OF MATTER.

Among the papers read before the American Association for the Advancement of Science, we notice an able one from the pen of Prof. Charles A. Seeley, of New York. The title of this paper was "The Classification of the Elements of Matter." In the introduction to this paper some points in the philosophy of classification were discussed, and a doubt suggested of the wisdom of creating classes of natural objects with confused and indefinite boundaries. The notion of atomicity was the foundation of modern chemistry, and was a part of almost every theoretical speculation on the subject. Various of the old groupings of the elements, on the basis of their physical properties, had been independently arrived at through the doctrine of atomicity. The elements had been divided into two kinds, viz., those of odd and those of even atomicity. Prof. Seeley was the first to observe that the elements of the two kinds which had corresponding or closely approximating atomic numbers were related in physical properties. In short, the elements are paired. Mr. Charles S. Peirce, of Cambridge, had greatly added to the illustration of the fact of pairing by representing in a diagram the elements in positions determined by ordinates representing the atomic numbers. The important conclusion of the paper was, that the various groupings of the elements by reason of physical properties were dependent upon certain numerical relations.

ACTION OF THE HUMAN HEART.

The general session of the evening of the 19th August was perhaps the most interesting to the general audience, partly because the proceedings were more generally and easily understood by those not skilled in scientific investigations, and partly on account of the rather sensational character of the experiments performed. On this occasion the physical peculiarities of the action of the human heart were clearly shown by the aid of a remarkable case of malformation of the thorax in a healthy living subject. Dr. Groux, a native of Hamburg, and at present a practicing physician in Brooklyn, N.Y., was born without the sternum or breastbone. Dr. J. Baxter Upham, of Boston, having been intimately acquainted for many years with Dr. Groux, has devised a number of ingenious experiments by which, in his case, the action of the heart is made to manifest itself both to the eyes and ears of persons situated at a considerable distance. It should be borne in mind that the action of the heart in Dr. Groux is perfectly normal and healthy, while the absence of the sternum renders it possible to make certain studies of the utmost importance, which are impossible in the case of the human being as ordinarily constructed. Dr. Groux's case has been treated of at length in various medical journals in Europe, but never before has it been brought in such a striking manner before so large an audience of scientific men. The mechanism of the heart is somewhat analogous to that of a double-action pump. In both cases the machinery, however perfectly it may work, makes some noise. Dr. Groux was able to show three distinct motions and sounds occurring successively, and a certain rhythm, in every beat of the heart. Dr. Groux also exercised the power, rarely bestowed and never used without great danger, of stopping at will, during a short period, the action of his heart. This was done this evening to the satisfaction of several medical men, one of whom was listening with the stethoscope at the chest, and two others feeling at the wrists for the pulse. For about twenty seconds the action of the vital organ in the frail chest of Dr. Groux completely ceased. Some years ago there existed an individual who was wont to experiment with himself in this manner, and who finally perished through being unable to resume the ordinary conditions of human existence. Dr. Upham, so far from encouraging his friend, Dr. Groux, in the repetition of this perilous experiment has earnestly entreated him never to make the venture again. Some years ago Dr. Groux, having made up his mind to travel in various cities of Europe and America, caused Rufus Choate, the renowned lawyer, to draw up a will making over his body, in the event of his death, to the surgeons for dissection. Portions of this will, which is a long document composed in Mr. Choate's happiest vein, were read to the great delight of the audience. The original draft, in the inimitable handwriting of Mr. Choate himself, was also exhibited. The experiments and explanations specially relating to Dr. Groux were given with great clearness by that gentleman, who is a regularly graduated physician. It is clearly of great advantage to science that this rare malformation occurs in one who is so well qualified to observe the obscure vital processes which it affords an opportunity of studying.

Dr. Upham contributed a valuable paper on the action of the heart, describing its anatomical position, appearance, and action. Our knowledge of its position had been improved by studies of the case of Dr. Groux. In death the relaxed muscles of the corpse caused the heart to fall somewhat from the place it naturally holds in life. The sounds of pulsation were fully described, as well as the intervals between the successive portions of the pulsation in the auricle, ventricle, and aorta. These intervals have been measured in thousandths of of a second by the chronograph, a valuable invention of the late Prof. Bond, of Harvard University.

At the conclusion of his lecture Dr. Upham gave some remarkable experiments. The beatings of the hearts of several of the physicians and patients of the City Hospital, in Boston, were automatically transmitted by telegraph from the hospital to the hall in Salem. By means of the magnesium light these pulsations were made to manifest themselves to the sight by the vibration of a beam of light on the wall of the darkened room. A regular pulse of 60 per minute was first sent. Then was transmitted the healthy pulse of an excited person, regular, but having a rapidity of 90 per minute. But the most interesting cases were those of a patient suffering from pneumonia, whose pulsations numbered 118 per minute, and that of another afflicted with organic disease of the heart. The irregularity of the beats in this latter case was vividly impressed on the mind by the sounds of the instrument. Prof. Farmer, the well-known electrician, assisted by a skillful operator from Boston, had charge of the electrical arrangements in Salem. Dr. Knight was in charge at the hospital in Boston. The Franklin Telegraph, too, gave the free use of their lines for the experiments, which were successful to a degree even surpassing the anticipations of Dr. Upham. It needs only to be added that these experiments are entirely new, and have their origin in Dr. Upham's studies for making the motions of Dr. Groux's heart perceptible to those in distant parts of a lecture room.

THE SEXES OF PLANTS.

The "Sorosisters," as a humorous friend calls the members of the Sorosis, may find comfort and support in a paper read by Professor Meehan. If male blossoms only grow in the weakest stems while the stronger stems produce female blossoms, does it not plainly show that the national weakness usually ascribed to females of the human family is utterly a mistake. It cannot be for a moment supposed that nature has different laws in the vegetable kingdom from those which govern the animal kingdom; *ergo* the weakness of woman must be artificial—the result of the dire oppression to which she has been for ages subjected.

Prof. Meehan referred to some discoveries published by him last year, showing that in plants of the pine family the greater the vigor of the axis or stem growth the greater was the adhesion of the leaves with the stem. Norway spruces only produced cones on the very strong branches. As they grew weaker they ceased to produce these, and only male ones followed. In the larch there was the same phenomenon. When the tree came to a bearing age the most vigorous shoots had the leaves adherent to the stems; only green acorns (commonly called leaves) appeared from the apices. As the shoots weakened they lost power of axial development, and the leaves the power of producing acorns, and true leaves grew in verticils or spurs. As these gradually grew weaker, they produced female flowers, and ultimately, when they became much weakened by shade or by a diversion of food into other channels, they produced male flowers. This was the last expiring effort of life—to produce male flowers and die. In the *amentaceous* plants a similar law of vigor in connection with sex prevailed. In the oak, the male flowers appear as soon as the leaf buds open in spring, but the female flower only appears after the shoot has achieved some vigor. In all other plants of this family—in the alder, hazel, walnut, hornbeams, etc., the male flowers were always in the weakest direction, the female in the strongest. So in the sedge grasses (*Cyperaceæ*), the apex was not always the most vigorous, but when it was the female flowers were there. Vigorous growth was only one form of vitality. Power of endurance was another. The hardiest individuals among Norway spruces pushed first into leaf, and these were far more productive of female flowers. Hermaphrodite flowers were not so good as those which had the sexes in separate flowers for observing this law, but yet abnormal forms showed the existence of the same law. Sometimes they showed a tendency to become pistillate or staminate, very double or very single; with the addition of petals, stamens, or other indications of male influence, came weakness. Double flower plants were difficult to root. Variegated plants were not easy to keep; on the other hand the apetalous violets and other tendencies in a female direction were always accompanied by increased vital tendencies.

The conclusion the speaker arrived at was that it is the highest types of vitality only which take on the female form; and suggested that probably the same laws prevailed in the animal world, but contented himself with the bare suggestion. The essayist merely presented a great number of facts, offering them not as an established theory, but as one of great probability and inviting further investigation.

THE CONSTITUTION OF MAN.—AINOS.

Among the *savans* in attendance at the Association is Clinton Rosevelt, a well-known scientific philosopher of this city. He read a paper upon the "Constitution of Man;" but beyond this brief announcement we have no inkling of the scope of this document. We do not doubt, however, that it was an able *eclaircissement* of the subject. Mr. Rosevelt is a student of the profound mysteries.

Professor Beckmore followed with a paper on "Ainos, or Hairy Men of Jesso, Saghalien, and the Kurlie Islands."

ON THE DISTRIBUTION OF COPPER IN THE ANIMAL KINGDOM.

[Translated or the Scientific American from "Aus der Natur."]

The presence of traces of copper in the blood of the lower animals has been for years an undisputed fact among chemists. In the blood of the higher animals, however, with few exceptions, no copper has been detected until lately. Wackenroder, for instance, discovered this metal in the blood of the duck, but not in that of the ox, the sheep, or the chicken. Its presence in the blood and in the muscle of the flesh of man has been asserted as often as it has been denied, and now, as there is no doubt that it sometimes occurs in the bile, and bile stones, and the liver of man, its existence in these organs is still considered to be merely accidental, the more so as it is well known they retain poisonous substances more than other organs. Some years ago, Mr. Ulex, in Hamburg, was led to search for copper in various animals by the following accident. From the 17th to the 19th of May, 1865, a dozen wild beasts died suddenly in the zoological garden in Hamburg. There being suspicion that they had been poisoned, a chemical examination of the intestines was undertaken. However, no well-known poisons could be discovered, except copper. The beasts had been fed with the flesh of a horse the day before, and, there being still some left, it was also subjected to examination. There being copper found, Ulex expected to be able to conclude his researches by the proof of the absence of copper in the flesh of a healthy, freshly-killed horse. To his great surprise, however, this metal occurred also in this case, indeed, in the most undoubted manner. A piece of beef having been examined with the same result, it gave rise to the supposition of a general distribution of copper in the animal kingdom. As the tests for copper are very easy and simple, as well as exceedingly sensitive, if properly applied, the respective investigations were extended by Ulex to animals of various zoological classes. The reagents employed were tested for copper in every case, and rejected if containing any. Ulex proved the existence of this element in the yolk of eggs, and in bath sponges. The quantity ranged from 0·01 to 0·10 per cent. Among the mammalia, it was found in the stomach and intestines of the European and Canadian lynx, and in those of some species of the leopard, jackal, and repeatedly in the flesh of horses and cattle. It was met with in Liebig's meat extract, which, as is well known, contains the soluble portions of beef in a concentrated form. Moreover, it was discovered in the breast of a "crick duck," in the yellow and white of an egg, more so in the latter than in the yolk. Among amphibials, in the geometrical tortoise, the viper, and frog. Among fishes, it was met with in the eel and torsk, and among animals of the lower classes, copper was met with in the following species: In *Crangon vulgaris*, the South American bird-catching spider, *Scolopendra Italica*, in the Spanish fly, the earth-worm and the ascaries, in the edible vine-snail, in sea stars, in the thick-hided echinanthus, and in the bath sponge. It is thus seen that copper was detected in every case where it had been searched for; this having been the case with accidentally chosen animals of various zoological classes, it may rightly be concluded that the metal copper, like iron, is of a general distribution in the animal kingdom. From this it follows that copper must also be present in plants, in the ground, and in the sea. Indeed, copper was detected in plants by Meissner and John more than fifty years ago, and later it was ascertained by Sarzeau to be present in more than five hundred vegetable species. In the earth, copper has been repeatedly detected, and so in the water of the ocean by Durocher, Malaguti, Field, and Piesse. If copper is found in the vegetable fiber, it follows that it must also be present in its industrial products. In order to ascertain this, Ulex selected a material that is daily employed by chemists, and, on account of its purity, highly esteemed by them, namely, Swedish filtering paper. Upon analysis it was found that ten grains of it yielded 6·03 grains or 6·3 per cent of ashes, from which a piece of copper half the size of a pin's head could easily be obtained. Charcoal also yields a cupreous ash, and as both paper and charcoal are made use of in the analyses spoken of, it might be suggested that the copper of these substances got into the analyzed materials, where, of course, they would have been found. Yet, this reaction has its limits. If it is possible to detect copper in ten grains of paper, and in a hundred grains of charcoal, it is not possible to find it in 0·25 grains of paper, or 0·1 grain of charcoal, which are the quantities used in each analysis. Besides, copper has been discovered in animal tissues without the use of either paper or charcoal. The above mentioned facts are certainly not without importance to physiology, judicial medicine, and pharmacy, but it is to be hoped, that in following them up, more light will be thrown upon this interesting topic.

Fell's Railway over Mont Cenis.

Dr. H. L. Sellers, of Natchez, Miss., writes us that the form of railway used on Mont Cenis, a notice of which was made in our issue of June 12th, was originally invented by his brother, G. E. Sellers, formerly of Philadelphia, who invented and patented a locomotive, operating exactly like the one in use on the road mentioned, about the year 1835.

Our correspondent perhaps feels aggrieved at what seems to him a transfer of the honor of this invention to Mr. Fell, but we have never understood that the invention was claimed by that gentleman, but, on the contrary, believe it has been understood by him and others who know the history of the matter to be an American invention. "Honor to whom honor is due," is a precept sometimes disregarded by eminent men, but we think in this case no honor has been claimed by Mr. Fell upon the ground of priority or originality in the form of either locomotive or track. He was the first to build and operate a railway on this plan.

How to Catch Rats.

The following is said to be a cheap and effective way to catch rats: Cover a common barrel with stiff, stout paper, tying the edge round the barrel; place a board so that the rats may have easy access to the top; sprinkle cheese parings or other feed for the rats on the paper for several days, until they begin to think that they have a right to their daily rations from this source; then place in the bottom of the barrel a piece of rock about six or seven inches high, filling with water until only enough of it projects above the water for one rat to lodge upon. Now replace the paper first cutting a cross in the middle, and the first rat that comes on the barrel top goes through into the water, and climbs on the rock. The paper comes back to its original position, and the second rat follows the first. Then begins a fight for the possession of the dry place on the stone, the noise of which attracts the others, who share the same fate.

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THE STORY OF A BOULDER.

The graduating class of Michigan University has placed in the campus, at Ann Arbor, an immense boulder. Dr. Winchell, at the solicitation of the class, gave the following history of this gigantic "specimen :"

THE BOULDER OF 1869.

This stranger to our precincts, appropriated and adopted by the class of 1869, has traveled hither from the far north. It is probable its home, for many ages, was upon the northern shore of Lake Huron. There it was wrenched from its ancient fastenings by a geological convulsion, seized in the grip of the glacier, borne three hundred miles over obliterated river and lake, and relinquished, at last, within sight of the future temple of Western learning. Here it has lain for perhaps a hundred ages, awaiting the advent of the class of 1869, and its final installation in the University as voiceless lecturer on the history and mutations of the world.

This traveled rock, to those who can enter into communion with it, recites a tale of varied adventure. It is a rock of much more than usual interest. It is a rock of rocks. It is not the stone of which the contemptuous could say, "A stone's a stone and nothing more." It is an epitome of petrology; it is a lithological museum; it is a geological science converged to a focus; it is a table of contents of the book of nature. Let us look into it.

This interesting rock is a heterogeneous conglomerate, containing about seventeen cubic feet, and weighing, consequently, about three thousand pounds. Whatever angularities it possessed when first venturing from home, have all been worn off by contact with the world. On one side may be discovered not only the polish due to the action of the glacier, but also one or two distinct furrows scored into the flinty substance of the rock.

The constituents of the conglomerate vary in size from grains of sand to fragments four or five inches in diameter. Most of these are themselves rounded and worn by some ancient conflict with geologic forces; but a few preserve still a rounded angularity. The constituent pebbles present a lively assortment of colors, from black to greenish blue, drab, rose-color, red, and white. The surface of the boulder intersects these various-colored pebbles without regard to hardness, quality, or complexion. It thus presents a diversity of colors worthy of some of the dashing patterns of modern calicoes. Indeed this rock, long familiar to all travelers over the "middle Ypsilanti road," has always been known as "the calico rock," and it is not impossible that this name gave it a charm in seniors' eyes. In studying carefully the composition of the boulder, I have recognized no less than twenty-one varieties of rocks and minerals: 1. Chlorite rock, a soft, homogeneous, blueish-green material, in fragments an inch or less in diameter; this is also called melaphyre by some writers. 2. Chlorite schist, in somewhat angular slaty fragments, on one side exposing a layer of about a square foot in extent. 3. Chloritic scales, or white crystalline chlorite. 4. Mica (muscovite) in scattered scales. 5. Argillite, of a reddish color, in limited amount. 6. Red jasper in small quantity. 7. Black jasper in smaller quantity. 8. Orthoclase in detached broken crystals, and as constituent of numerous pebbles. 9. Porphyrine, in numerous fragments of a homogeneous, reddish color. 10. Petrosilex, moderately abundant, and very hard. 11. Glassy quartz in detached fragments of the size of a marble and less. 12. Rose quartz. 13. Smoky quartz. 14. Silicious schist. 15. Granular Quartzite. 16. Quartzose grit. 17. Quartzose conglomerate. 18. Granulite, with abundant deep red orthoclase. 19. Granulite, with abundant pale red orthoclase—the last two and the second named constituting half of the bulk of the boulder. 20. Gneiss, in limited amount. 21. Pyroxenic gneiss in greater abundance.

The boulder illustrates, moreover, the phenomena of—1. Massive structure. 2. Schistose structure. 3. Gritty structure. 4. Pudding stone. 5. Semi-breccia. 6. Glacial polish. 7. Glacial grooves. 8. Glacial transportation.

Here are not less than twenty-nine geological phenomena set forth by the teaching of a single stone.

But this is not all. It is a revelator of unseen and impalpable facts. It speaks a history. In contemplating this lost rock we are led to think of the modern epoch, during which it has lain exposed upon the surface of the earth, beaten by a thousand wintery storms, the witness of the life and history of the savage tribes which pursued their game or fought their battles among the hills and vales of the "beautiful peninsula." And then we think of the time when it was first transported to this region, and picture to ourselves the wrestling and the crashing of the great glacier along a journey of three hundred miles, and continued over a period of a thousand years or more. And next, we ask where the glacier picked it up, and under what circumstances it found our boulder existing. It may have wrenched it from a projecting crag; it may have found it a fragment torn by an earthquake convulsion from its parent bed. But the parent bed, where was that? What had been its history? There was, and probably still remains, an extensive formation of rock, of which the glacier has brought us this specimen. There was an older time, then, when the powers of geology in their untamed energy were engaged in bringing together from twenty shores the materials which were to enter into the constitution of that formation. Who shall discover the shores whence they were gathered? They are the ruins of a continent which nourished the growth even of the eozoic continent—the growth even of the *germ* of North America. Into the dim horizon of eternity sink the desolate undiscovered shores of that first-born land. But it existed. Nor was that even the beginning. Imagination is called upon to take another flight into the retreating ages of terrestrial history. This granulite, this gneiss, this chloritic schist—these are themselves products of sedimentary deposition which went forward during an age anterior to the time when these rocks were bluff-bound shores yielding debris for our conglomerate. If the constituents of these were not themselves ground from some still more ancient beach, they show at least that old ocean existed, and was even then occupied in laying down courses of sediment—even of pure chemical precipitates—which were destined to be rewrought into rocks that should stand to the age of man.

Perhaps the visible testimonies of our boulder go no further. But they have given thought an impulse which refuses to be arrested even at this limit. She demands what sort of a sea-bottom that primeval ocean rested upon. Was it also a bed of rock that had been accumulated in an ocean? If so, upon what sort of a bottom did that older ocean rest? There must have been an ocean, in the history of the world, which rested on a floor of refrigerated lava. There must have been a *first* ocean. To deny it is to deny that our globe has been in progress of cooling from a natural beginning. To deny it is to assume that its history began in the midst of an evolution that, under the laws of nature, is as likely to have had antecedent as subsequent terms. It is to deny that the earth has been cooling as long as physical laws render possible. It is to *assume* that it was created in mid career instead of at the commencement of it. It is a suicide of the positive philosophy which makes the denial, since, by denying the existence of an antecedent molten condition of the globe the positivist postulates a creation at a point where creation was not necessary—obtrudes the ever incomprehensible miracle of creation at a juncture when he must perform another miracle by interrupting the spontaneous course of nature.

So builds reason on the foundation stones bound up in this boulder. Even from this rock we mount into the past eternity, and grope for that beginning which was the source, the fountain—*bereshith*—whence flowed naturally the stream of events which we trace, by the lamp of science, down through the geologic ages, and witness, even to-day, rushing like a mighty tide before our eyes, and bearing man himself along, with all his works, into the abyss of future years.

And when thought reaches this limit she finds herself confronted by an adamantine wall. Beyond this is only Omnipotence; and while the deep utterances of the soul of man speak ever of primary causation, reason discovers here that primary cause. This is the response of science to the intuitions of the soul. This is the triumph of the soul when science falls disabled. This is the harmony between nature and mind; this is the unison of philosophy and faith.

Thanks, from the depths of the heart, that this ancient, war-worn boulder, smitten by the wand of science, has opened such a permanent fountain of God's eternal truth.

The Fire Alarm for New York City.

A new fire alarm for New York city is now in process of construction, the details of which are important as foreshadowing a general improvement in the methods now employed in giving notice of fires in most of the large cities in the United States.

The system will differ in many respects from any system of fire alarm now in existence, but will combine all the best features of the telegraphic fire alarms now in use in other cities, the external apparatus to be made in a tasty and ornamental style.

The Central Office of the new system will be established in the building known as Firemen's Hall, in Mercer st., and is to be provided with the following appliances:

A sufficient number of self-acting, paper-registering apparatuses (with or without accompanying "relays," as may be deemed necessary), attached to the signal circuits, whereby alarms for fire received may be printed upon paper, to be detached and filed away for reference; a test indicator for each circuit, whereby its general condition may be ascertained at any time, and, in addition, apparatus and appliances, to be on the principle of that used in testing the Atlantic Cable, enabling the operators to examine and test for faults, breakages, and the usual disturbances to which telegraph lines are subject; an "electro-magnetic watch clock," by means of which the tests made by the operators in charge, at stated intervals during the twenty-four hours, may be recorded; one or more alarm bells, so arranged that a break in the continuity of any of the several circuits shall be indicated, and notice given to the operator; an apparatus for automatically sending out to the various alarm stations the signal number which may be required, and so arranged that, being capable of being set to any number, from 1 to 999, when thus set and started into action, its circuit wheel, set to the required number or alarm, acts by proper appliances, so that the alarm is sent out on each circuit successively, and with equal and great force, and in so rapid a manner that the entire number of alarm stations shall receive one blow on the gong within one and one half seconds, although the force of the battery is thrown on only ten circuits at one time. One such apparatus shall also be attached to the "signal station" circuits, and in like manner as above, the "alarm" shall be tapped on each or all the signal boxes; also, one or more switch-boards, with sufficient switches, circuit-breaking keys, and other appliances as shall permit alarms being sent on one or more of the several circuits as may be desired.

All of the machines and other attachments and appliances are to be of the finest workmanship, elaborately finished and mounted, and so designated in all their multitudinous functions that the operator in charge shall be able to handle them with celerity, and have the fullest and most complete command over all the circuits at all times. Communication with the central office of the Police telegraph will be established by means of improved "dial machines," so arranged as to be capable of expressing in a comprehensive and rapid manner the peculiar style of message relating to fires, which are usually forwarded to and from that office. The chief innovation of the new system, and the one in which a belief in its usefulness is mainly placed, is in the alarm stations scattered throughout the city, but conforming as nearly as possible to the code of signal stations now in use.

The stations will be placed nearer together in the upper part of the city, and the time to be gained in giving notices of fires is to be found in the fact, that from each one of these stations an alarm can be given, which is not now the case. At each of these stations is to be placed a mechanical gong ringer, so constructed that the power of a single cup of small capacity shall start the machinery, which strikes a gong or bell of about twenty pounds weight, and the machine is constructed to work upon either an open or closed circuit. The machine, with the weight, will be inclosed in a black walnut case with glass front—the door having a good brass tumbler lock and one key—and securely fastened to the wall of the station in such part of the building as may be indicated. The The case is so constructed that the weight can be wound up without the case being opened, and an indication given when the weight is run down. Each is supplied with a good lightning arrester, and a telegraph key, and the wires, leading from the poles to and from these machines will be suitably insulated and properly protected.

Each "street box" will be constructed of iron, roof-shaped, with an outer and an inner case, containing an automatic signal machine, which is wound up and started into operation by pulling a button or similar device; the door of the outer case to be opened to obtain access to the button. The inner case is to contain the automatic machine—itself securely incased in an iron box—which is to have its circuit-wheel cut corresponding to the station number, and must be capable of signaling that number with perfect exactness and uniformity; the machines on each circuit to be so speeded as to give a slightly different rate of signal, so that when two or more signals are to be received at the Central Office, they may be readily distinguished. This machine is to be of the finest construction, and capable of running with a one-ounce weight attached to the handle. The inner case is also to contain a bell magnet, or electric alarm bell, which will sound sufficiently loud to be heard ten feet from the boxes when closed, a signaling key, and a good lightning arrester. The outer door is to be provided with a strong brass tumbler lock, with five keys. The inner door, to which is attached the button or device for starting the machinery, will also be provided with a strong brass tumbler lock and one key. All the locks of the outer cases are to be uniform in style and wards. The keys of these boxes are to be in the charge of the policemen and firemen, except one for each box, which is to be left at a place to be stated by a plate on the box itself, so that it can be accessible at all hours to any person discovering a fire. The boxes are to be placed, whenever practicable, in such public places as hotels and drug stores, which are open all the time, and are uniformly to be made long and narrow, so that they will not be cumbersome when placed upon the telegraph poles, as in many parts of the city they must be.

Bubbles of Mercury Floating on Water.

When the lecture room of a chemical laboratory is provided with a sufficient supply of water under strong pressure, it is possible to make, and exhibit there an experiment, which, owing to a deficient pressure of water in such rooms, has been almost unnoticed. The experiment is the following: Under an ordinary water tap, the opening of which has from 10 to 12 m. m. diameter, a large sized porcelain basin is placed, containing from 15 to 20 kilos. of mercury; the water tap being suddenly opened, a strong flow of water is caused to fall into the basin at a hight of from 8 to 10 centimeters from its bottom. On turning off the flow of water again, it will be seen that on the surface of that fluid there float about bubbles of mercury, usually exhibiting a diameter of only one centimeter, but occasionally some are found of two or three times that size. As a rule these bubbles are very ephemeral; now and then, however, it happens that some may be caught, along with a quantity of water, in a small beaker glass, and, on the mercurial bubbles bursting, it will be seen how very small a quantity of mercury these bubbles consist of. Professor Hofmann mentions that he saw this experiment first exhibited in the lecture room of the Royal College of Chemistry, London, when, some twenty years ago, Professor Melsens, from Bruxelles, was on a visit there. The pressure of water at the lecture room just named is from 10 to 12 meters; in the new laboratory of Berlin University the pressure of the water circulating in the tubes and pipes is from 20 to 25 meters.

A New Pyrometer.

Everybody knows the difficulties which stand in the way of exactly estimating high temperatures. The best pyrometers we have had hitherto can only be supposed to give approximate results, and some of them may be very wide of the truth. It is now announced that M. Lamy has devised an instrument which shows within two or three degrees Centigrade the temperature of a furnace heated up to redness, and gives its indication at a distance from the furnace, so that at a porcelain factory, for example, a manager can sit in his office and see the temperatures of all the furnaces in his establishment. The instrument is as simple as it seems to be efficient. It is merely an iron retort, containing marble, the neck of which communicates, by means of a narrow tube, with a needle moving over a dial plate. As the heat rises, the marble is decomposed, and carbonic acid set at liberty. A special contrivance measures the tension the gas arrives at, and as this has a direct relation to the temperature, the measure of the one is made the measure of the other. Up to a certain point, we have little doubt this instrument may be relied upon.

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The Reef-building Corals.

The variety of compact and branching corals far exceeds description: 120 species are inhabitants of the Red Sea alone, and an enormous area of the tropical Pacific is everywhere crowded with the stupendous works of these minute agents, destined to change the present geological features of the globe, as their predecessors have done in the remote ages of its existence.

Four distinctly different formations are due to the coral-building polypes in the Pacific and Indian Oceans: namely, lagoon islands or atolls, encircling reefs, barrier reefs, and coral fringes, all nearly confined to the torrid zone.

An atoll is a ring or chaplet of coral, inclosing a lagoon, or portion of the ocean, in its center. The average breadth of that part of the ring which rises above the surface of the sea is about a quarter of a mile, often less, and it is seldom more than from six to ten or twelve feet above the waves; hence the lagoon islands are not visible, even at a very small distance, unless when they are covered by the cocoanut palm, or the pandanus, which is frequently the case. On the outside, the ring or circlet shelves down for a distance of one or two hundred yards from its edge, so that the sea gradually deepens to about twenty-five fathoms, beyond which the sides of the ring plunge at once into the unfathomable depths of the ocean, with a more rapid descent than the cone of any volcano. Even at the small distance of some hundred yards, no bottom has been reached with a sounding line a mile and a half long. All the coral in the exterior of the ring, to a moderate depth below the surface of the water, is alive; all above it is dead, being the detritus of the living part, washed up by the surf, which is so heavy on the windward side of the tropical islands of the Pacific and Indian Oceans, that it is often heard miles off, and is frequently the first warning to seamen of their approach to an atoll.

The outer margins of the Maldive atolls, consisting chiefly of millepores and porites, are beat by a surf so tremendous that even ships have been thrown by a single heave of the sea, high and dry on the reef. The waves give innate vigor to the polypes by-bringing an ever-renewed supply of food to nourish them, and oxygen to aerate their juices; besides, uncommon energy is given and maintained by the heat of a tropical sun, which gives them power to abstract enormous quantities of solid matter from the water to build their stony homes, a power that is efficient in proportion to the energy of the breakers which furnish the supply.

On the margin of the atolls, close within the line where the coral is washed by the tide, three species of nullipores flourish; they are beautiful little plants, very common in the coral islands. One species grows in thin spreading sheets, like a lichen; the second in strong knobs as thick as a man's finger, radiating from a common center; and the third species, which has the color of peach blossom, is a reticulated mass of stiff branches about the thickness of a crow's quill. The three species either grow mixed or separately, and although they can exist above the line of the corals, they require to be bathed the greater part of each tide; hence, a layer two or three feet thick, and about twenty yards broad, formed by the growth of the nullipores, fringes the circlet of the atolls and protect the coral below.

The lagoon in the center of these islands is supplied with water from the exterior, by openings in the lee side of the ring, but as the water has been deprived of the greater part of its nutritious particles and inorganic matter by the corals on the outside, the hardier kinds are no longer produced, and species of more delicate forms take their place. The depth of the lagoon varies from fifty to twenty fathoms or less, the bottom being partly detritus, and partly live coral. In these calm, limpid waters the corals are of the most varied and delicate structures, of the most charming and dazzling hues. When the shade of evening comes on, the lagoon shines like the Milky Way, with myriads of brilliant sparks. The microscopic medusæ and crustaceans, invisible by day, form the beauty of the night, and the sea-feather, vermilion in daylight, now waves with green, phosphorescent light. This gorgeous character of the sea-bed is not peculiar to the lagoons of the atolls; it prevails in shallow water throughout the whole coral-bearing regions of the Pacific and Indian Oceans.

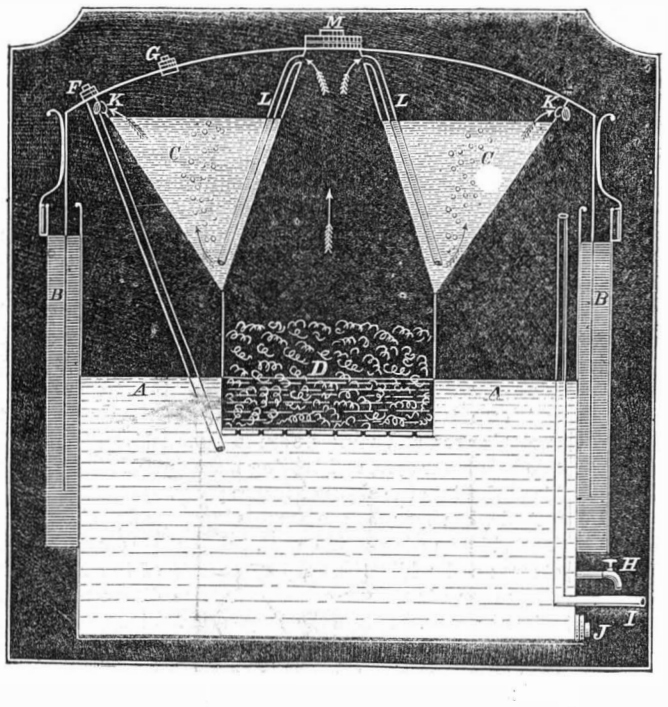
Encircling reefs differ in no respect from the atoll ring, except in having islands in their lagoons, surrounded also by coral reefs. Barrier reefs are of the same structure as the atoll rings, from which they only differ in their position with regard to land They form extensive lines along the coasts, from which they are separated by a channel of the sea of variable depth and breadth, sometimes large enough for ships to pass. A very long one runs parallel to the west coast of New Caledonia, and stretches for 120 miles beyond the extremity of the island. But a barrier reef off the northeastern coast of the Australian Continent is the grandest coral formation existing. Rising at once from an unfathomable depth of ocean, it extends for 1000 miles along the coast, with a breadth varying from 200 yards to a mile, and at an average distance of from 20 to 60 or 70 miles from the coast, the depth of the channel being from 10 to 60 fathoms. The pulse of the ocean, transcendently sublime, beats perpetually in peals of thunder along that stupendous reef, the fabric of almost microscopic beings.—*Mrs. Somerville.*

An Old Map of Pittsburgh.

By the kindness of Mr. A. T. Haumann, Civil and Mining Engineer, of Pittsburgh Pa., we are in receipt of a map of Pittsburgh as it was in 1795. It is a very interesting document, and shows the exact position of the fortifications and barracks, of historical importance in connection with the early frontier wars of this country. The years which have since elapsed have made immense changes in the appearance of the town. At the period mentioned the sky was occasionally clouded by the smoke of artillery; now it is almost constantly veiled by the smoke of its manufactories, and its atmosphere resounds with the din of giant industries. Mr. Haumann will please accept our thanks. The map is photographed, and we presume may be obtained on application to Mr. Haumann at 130 Smithfield street, Pittsburgh, Pa.

APPARATUS FOR GENERATING ILLUMINATING GAS FROM THE LIGHT HYDROCARBONS.

The many obstacles in the way of making illuminating gas in portable apparatus have been very serious drawbacks in the successful operation of most of those heretofore offered to the public, the reasons being that the question is partly one of a chemical nature, and inventors, for the most part, mechanical people. Chemists rarely apply discoveries in a practical form, and mechanics are not sufficiently versed in the science to give it mechanical shape. This question requires a combination of the two sciences. Numbers of machines of all kinds have been made for making gas by passing atmospheric air through one of the volatile hydrocarbons; but owing to the fact that air does not combine with the vapor, together with other causes of failure, most of them have proved worthless, the vapor condensing in the pipes of the building, and choking up the same when they reach the temperature of 40° Fah.



We are now called upon to notice an invention which the inventor claims has none of the objections which may be brought against many which have preceded it. The engraving is a vertical section of an apparatus invented by Mr. C. F. Dunderdale, of 90 Wall street, New York city, for generating hydrogen gas by immersing scraps of iron shavings into diluted oil of vitriol with water, as shown at D in the engraving. The hydrogen rises therefrom, as shown by the arrows, and enters the pipe, L, in a heated state, passes down the same, and rises through a hydrocarbon contained in a compartment as seen at C. Here combining with the vapors it passes out through valves at K into the holder, which, having its edges sealed with water, B, rises, and if the gas is not being used it lifts a basket out of the dilute acid containing the metal scraps, which then remains inactive until the gas is used, when it again begins to generate as fast as used. The gas formed is carbureted hydrogen, a rich and powerful illuminating agent. It cannot be set on fire in its pure state, and the apparatus is therefore non-explosive. It is burnt in the smallest sized common gas jets like coal gas, and the inventor assures us costs less than half the price of coal gas as charged by the New York gas companies. He further asserts that it only requires from one third to one fifth the quantity that is required of coal gas to give the same amount of light. The machine being automatic requires very little attention. F, G, H, I, J, and M are caps and pipes for feeding the machine and drawing off the gas and contents of the machine when necessary. The salt (sulphate of iron) precipitated in the bottom of the machine is valuable, being largely used in dyeing, tanning, ink making, etc., and if saved and sold will, it is claimed, sell for as much as the whole cost of the gas.

The apparatus is made of material that is not affected or injured by the presence of the acid, and will last for years, and admit of a comparative low cost.

This will interest all gas consumers. Full particulars and information relating to it can be had by addressing the inventor and manufacturer as above.

IN our last number we alluded to the serious want of water in Philadelphia. There is water enough it seems in the river, but it has heretofore been made to pump itself up by turning turbine wheels, and the process wastes ten or twelve gallons for every one made practically available. Plans are maturing for the construction of permanent steam pumps, so as to prevent a recurrence of the alarming dearth of water under which the greater part of the city is now laboring. All the steam fire-engines of the city have been called into requisition to pump water into the Fairmount reservoir. Two of them are on duty at a time, and their united efforts throw over 1,000,000 gallons into the reservoir in twenty-four hours.

Method of Detecting Poisonous Gases---The Gasophaner.

The *Pioneer*, England, states that a discovery has been made by an officer, which, if the results on a large scale are at all commensurate with the experiments made on a small one, may prove of great value in giving a timely indication of the approach or presence of that poisonous state of the atmosphere which is generally believed to precede cholera and other epidemic diseases.

The gasophaners, or poisonous gas indicators, as the discoverer calls them, are easily and cheaply made. A piece of fused boracic acid, the size of a walnut, from which the water of crystallization has been expelled, is heated to redness in chlorine, or has dissolved in it while hot a small quantity of common salt, care being taken that there is not sufficient soda—16 per cent—to convert the boracic acid into borax, which would spoil the effect. The red-hot lump of boracic acid thus charged is blown with a common glass-blower's tube into a thin glass ball or bulb, about the size of a small hand-lamp shade, and the gasophaner is ready for use. When first made, the glass is clear, with beautiful iridescent colors, due partly to the thinness of its sides; but left for a time, shorter or longer, according to the amount of moisture in the atmosphere, in normal breathing air, it becomes covered or clouded with a light blue film (due chiefly to the carbonic acid gas of atmosphere), which, combined with the iridescent colors beneath, has an opaline or pearly luster. On bringing the clouded gasophaner carefully to the flame of a spirit lamp, this film instantaneously vanishes, leaving the glass of that part again clear and shining. The delicacy of this test is so great that, although by breathing on the newly-made gass, the film may be much more rapidly formed than by mere exposure to the atmosphere, an approach to the spirit lamp flame will no longer drive off the carbonated compound formed, on account of the impure gases contained in breath. At the same time, carbonates thus formed from the breath of a child, or of an extremely healthy person, vanish precisely as the aerial ones do on application of gentle heat. Held over a solution of ammonia, the air carbonate will not form, except on the upper part, where the ammoniacal gas has less action; but if held so that the breath may mix with the ammoniacal gas, a thick white cloud of carbonate of ammonia without opaline luster, covers the gasophaner. This cannot be driven off by heat, but froths up on an approach being made to the lamp flame. But the most remarkable indication given by the gasophaner is when it is held over a solution of sulphureted hydrogen. The gasophaner immediately becomes pitted, as it were, with small-pox, on the surface next the gas; and these spots, on being examined with a microscope, are found to be round radiated crystals, the center or nucleus of which soon bursts into a hole. They are white by transmitted and dark brown by reflected light. Nitride of boron gave exactly similar crystals as the chloride, and so did pure boracic acid. These crystals, therefore, are presumed to indicate a combination of boron with hydrogen a fact hitherto unknown to chemists. The gasophaner can be re-heated and re blown as often as required.

American Locomotive Boilers.

It is impossible, says *Engineering*, for an English engineer to read the records of American boiler explosions without being struck by the very large number of failures of locomotive boilers which occur annually on the other side of the Atlantic. In this respect the American records form a strong contrast to those of explosions in this country. Here the number of locomotive boiler explosions seldom exceeds three or four per annum, and considering the large number of locomotives now at work in the United Kingdom, locomotive boilers may be said to possess a greater immunity from explosion than almost any other class. To a great extent, this is, no doubt, due to the fact, that locomotive boilers are, almost always, worked under skilled superintendence, and subject to frequent inspection; but it is, also, due to their being, with but few exceptions, well constructed, in the first instance, and properly proportioned for the work they have to perform. In America, locomotive boilers, although under quite as skilled superintendence as our own, are yet more liable to explosion from the fact of their having generally less superfluous strength when new than would be considered necessary by our railway engineers. American locomotive superintendents use 5-16 and 3-8 inch plates, where we should use 7-16 or 1-2 inch; and notwithstanding the high pressures used, double riveting is still the exception rather than the rule. The consequence of all this is, that in a list, now before us, of 94 boiler explosions which occurred in the United States during 1868, no less than 23 explosions of locomotive boilers are recorded, these explosions thus amounting to over 25 per cent of the whole; while from another record of the explosions which took place in the month of May last, we find, that during that month four locomotives exploded on different American lines. These are facts which demand the serious consideration of American locomotive engineers, and we trust that in the records of future years we may find evidence that the lessons which they teach have not been disregarded.

A REMARKABLE statement has been made by Mr. Higson, the inspector appointed by the British Government, during the course of the inquiry into the Haydock calamity. He said that he "believed that half the explosions in Lancashire had taken place through the mere getting drunk of the miners over night."

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OBSERVATIONS OF THE ECLIPSE AS SEEN AT WESTPORT, KY.

[Reported for the Scientific American by G. H. KNIGHT.]

On the afternoon of August 7th, 1869, the writer formed one of a group of observers posted upon a bluff about three hundred feet high near the town of Westport, Ky., commanding, toward the north and west, several miles of the Ohio river and a wide expanse of Indiana lowlands.

Telescopes of various grades, from the 120 diameter down to opera glasses, were in active requisition. All were gazing in silence, and the steel hand of the chronometer had reached 4:31 P. M., when one observer—he of the 120 diameter—exclaimed, "She's touched him!" A minute later, a dark notch on the sun's lower right quarter was visible to the naked eye, and, shortly after, the light and then the heat began sensibly to decline.

Now fades the glimmering landscape from the sight,
And all the air a solemn stillness holds.

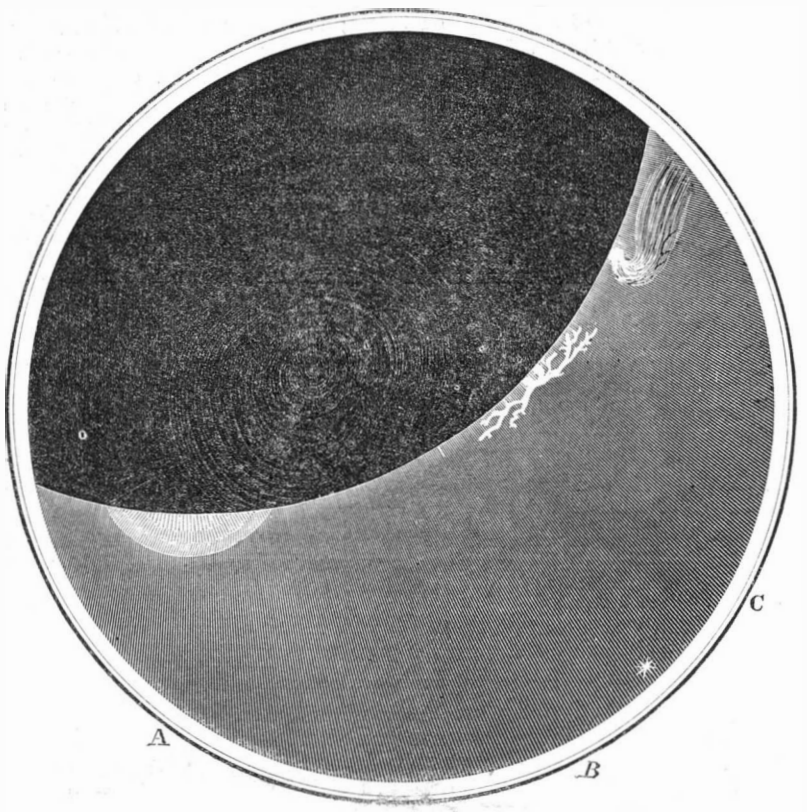
Finally the crescent of sunlight slowly narrows to an attenuated, broken thread, skirting the left edge of the moon; we are just able to read the hour 5 : 29 P. M.; and, lo! the sun has *vanished!* and out flash in all their glory the weird and startling wonders of a solar eclipse!

It is impossible, during the few fleeting moments of totality, for the dazed and bewildered beholder to grasp all the marvels of the scene. Venus and Mercury blaze with more than nocturnal splendor. An aurora-like halo radiates from the moon's periphery far into space. The air is clammy with moisture as that of a cavern.

But we have only two precious minutes, and leave our new acquaintances—Mercury, the somber woods, the leaden sky, the inky river—to other observers, and direct our 120-magnifier to the red specks, some six or seven in number, now plainly discernible around the moon's margin.

These appearances, when brought within the field of the telescope, show a surprising individuality, and all, by shape, suggest violent disturbance, whose motions are, however, of course invisible by reason of the immense distance, and can be ascertained, if at all, only by a record of impressions of successive observers stationed along the track of the swiftly-gliding shadow.

The tube is directed to a point, A, near the moon's nadir (uppermost or inverted in the instrument) occupied by the brightest of these lights. The apparition seems to radiate from some point hidden behind the moon's disk, beyond which it emerges in brilliant silver, copper, and ruby-colored coruscations, the copper tints predominating, and terminates in a circular arc like a half-set sun. The impression conveyed to an observer is of a vast explosion from a center some twenty thousand miles over the edge of the sun's disk, and extending therefrom about fifty thousand miles in every direction.



THE ECLIPSE OF 1869.

About fifty degrees of the moon's circumference from the apparition, A, we observe a second and wholly different one, B, which bears a grotesque resemblance to a stag's antlers or to the strands of a raveled rope tossed about by a whirlwind. The shape and coruscations of this apparition suggest electrical action (fancy an electric spark 500 miles thick!) or the deflagration of some liquid metal. Its color is crimson; its hight about twenty thousand miles.

Still another and totally different emanation is seen at C, and wears the semblance of a horse's tail, or, more nearly, of a puff of smoke drifting northward, and illuminated by the rosy hues of sunset.

At this stage of observation some one jogged the instrument, and before it could be adjusted to another group, a glint of sunlight from the disk's right margin blinded our unaccustomed retinas and flooded the landscape with returning day. At the same instant, looking upward, we beheld the moon's black shadow, *sharply defined as a wall in the air*, sweep majestically away from right to left before our very eyes—and the total eclipse of 1869 had become a thing of the past!

With our present meager array of facts, hypotheses are premature. On the globe we inhabit, the alternations of days and seasons, tidal and climatic changes, and the other endless metamorphoses of matter—are all referable to solar action; but the sun itself has no sun, and its heat seems too intense for many of the terrestrial phenomena of chemical action. A cause may, however, exist in meteorolites which, falling with inconceivable velocity and possessing a high spheroidal repulsion, may carry with them into the sun's seething chaldron a comparatively cold body of disturbing elements and give rise to the mechanical and other perturbations whose manifestations have been noted.

Stenographic Reporting by Machinery.

It is said that a stenographic press has been invented in England by the use of which the art of reporting *verbatim* can be acquired in much less time than by the old methods. The reporter sits at something like the keyboard of a pianoforte, and by applying his fingers to the keys, prints the words as they drop from the lips of the speaker, syllable by syllable, on a strip of paper which rolls along underneath. When we say this, we do not, of course, mean that the words are printed in letters. The keyboard appears to be divided into three parts of eight keys each. The left side, worked by the four fingers of the left hand, prints signs which represent initial consonants; the right, worked by the fingers of the right hand, prints final consonants; and the middle, acted on by the two thumbs, prints the medium vowels. We gather that something like a phonetic system of signs is employed. A few months' practice is said to enable any operator to follow the most fluent speaker with ease. We ought to say that M. Gensoul's system renders it unnecessary to transcribe the copy. Just as with the phonetic system, if legibly written, the compositor can set up the speech in common type, from the printed strip furnished by the machine. As to the comparative ease of writing characters with a pen and printing them in the way here described, we can give no opinion.

Of this machine an English exchange humorously says:

"What we should certainly miss, if the machine came into use in the galleries of our Houses of Parliament, would be the happy skill with which the reporters condense the speeches from their notes. We have very few speakers who could bear to be reported by a machine."

So far as the description gives us any idea of the construction of this machine it does not materially differ from one constructed and invented nearly eighteen years ago by Mr. Fairbanks, then in the employ of this office.

DURATION OF THE ENGLISH COAL FIELDS---THE INTERNAL TEMPERATURE OF THE EARTH.

The inaugural address of Sir William Armstrong, President of "The Institution of Mechanical Engineers," at its annual congress which assembled at Newcastle-on-Tyne, England, on the 3d August, made some encouraging statements in regard to the duration of the English coal fields, a subject that has latterly attracted much attention.

He remarked "that coal had a special interest for them in a locality celebrated, since the earliest days of coal mining, for the production of that invaluable mineral. England, with her innumerable steam engines and manufactories, is more dependent upon coal for the maintenance of her prosperity than any other nation, and the question of the duration of her coal fields now very properly occupies the attention of a Royal Commission. The investigations of the Commission are not yet completed, but so far as they have gone the results are reassuring. He concurred in the probable accuracy of the announcement lately made by two of his fellow commissioners, that the total quantity of coal in this island will prove to be practically inexhaustible; but until the complicated details of quantities collected by that Commission have been put together, and expressed in totals, it is difficult to judge with certainty or accuracy on the subject. Although the duration of our coal may, geologically speaking, be practically unlimited, we have still to consider the important question—How long will England be supplied with coal as good and as cheap as at present? We have unquestionably made greater inroads into our best and most accessible coal beds than other nations have done into theirs; and if foreign coals should grow better and cheaper, and ours dearer and worse, the balance may turn against us as a manufacturing country long before our coal is exhausted in quantity. It is clear that our stock of good coal is very large, but most of it lies at great depths, and one of the most important questions the Royal Commission has to investigate is the depth at which coal can be worked with commercial advantage.

"The chief obstacle" the President continued, "to reaching extreme depth is the increase in temperature which is met as we descend. He was justified by ascertained facts in saying that this rate of increase will, as a rule, prove to be not less than 1° Fah. for every 20 yards in depth, and there is reason to expect that it will be even more rapid at greater depths than have yet been attained. The constant temperature of the earth in this climate, at a depth of 50 feet, is 50°, and the rate of increase as we descend is to be calculated from this starting point. Adopting these figures, it would be found that the temperature of the earth will be equal to blood heat at a depth of about 980 yards, and, at a further depth of 500 yards mineral substances would be too hot for the naked skin to touch with impunity. It is extremely difficult to form an opinion as to the maximum temperature in which human labor is practicable in the damp atmosphere of a mine, and it is almost equally difficult to determine how much the temperature of the air in the distant parts of an extremely deep mine can be reduced below that of the strata with which it is brought in contact. It is certain, however, that the limit of practicable depth will chiefly depend upon the mechanical means which can be provided for relieving the miners of the severest part of their labor, for maintaining a supply of sufficiently cool air at the working faces of the coal, and for superseding the use of horses, which suffer even more than men from highly-heated air.

"For the relief of labor we must look to coal-cutting machines for improvement of ventilation to exhausting fans, and for the superseding of horses to hauling-engines driven by transmitted power. The employment of coal-cutting machines, worked by compressed air, conveyed into the mine by pipes, is already an accomplished fact; and when the difficulties and the objections which usually adhere, for a considerable time to new mechanical arrangements, are removed from these machines, they will probably attain extensive application. One of the earliest attempts at coal-cutting by machinery was described by the late Mr. Nicholas Wood, at the former Newcastle meeting of this Institution, and all the really practical results as yet obtained date from that period. The cooling influence of the expanding air as it escapes from these machines, will be a collateral advantage of considerable importance in the hot atmosphere of a deep mine. The air discharged from the pneumatic coal-cutting machines now in use in the Hetton Colliery, escapes into the mine at a temperature of 7° below freezing, and the cold air from each machine appears to be sufficient in quantity to lower the temperature of the circulating atmosphere by 1°. If, as seems to be probable, six or seven of these machines can be employed at each working face, we may by this means lessen the heat by a corresponding number of degrees, and thus afford very considerable relief. The employment of compressed air as a motive power, in substitution of horse traction, is also quite feasible, and may be expected to become quite general in very deep workings. As regards ventilation, the fan machines of the several constructions tried have already exhibited great superiority over the old method of ventilating by an upcast furnace shaft; and although the efficiency of the furnace system of ventilation is increased by depth, there is reason to believe that the fan will maintain its superiority to greater depths than are likely to be reached in mining."

Facts Elicited During the Recent Debate in England Relating to Patents.

The recent attempt to subvert the patent system in England and the discussion which followed, have elicited some interesting and instructive facts. For instance, it was shown that for centuries flour was ground under unpleasant conditions. The miller in the time of Chaucer had to work amid a cloud of flour which obscured the air, filled his nostrils, irritated his lungs, and lessened his profits. The millers of this generation had the same difficulty to contend against and the same lament to make, until their chief grievance was removed by an inventor. Countless attempts have been made to remedy the evil. These failed either because the flour was drawn away too rapidly, and the waste increased, or because the draft was insufficient, and the nuisance became worse than before. At last, the golden mean was achieved by Mr. Bovill. He succeeded in adjusting the several parts of the millstones so as to multiply their efficiency, yet prevent any flour from filling the air. For this he obtained a patent. Instead of being grateful to the inventor and ready to pay a royalty to the patentee, the millers of England combined together to procure the patentee's ruin by subverting his legal title to the fruit of his brains. What they want is free trade in this invention. Sir Roundell Palmer declares them justified in protesting against the act of him whose ingenuity has conferred a benefit on their trade. The plea is that in process of time each miller could have made the discovery for himself. The supposition is that if there is a demand for an invention the supply is as certain as is the supply of loaves when corn is abundant.

The difference between the two cases is a difference in substance as well as degree. Necessity may be the mother of invention in common speech, but without being so in actual experience. The most pressing demand for a particular improvement has no other effect than that of calling forth a host of suggestions, of which three fourths are foolish and the other fourth is inadequate. All the millers in England had failed to make the change which Mr. Bovill made in their mills. Those who are constantly engaged in a pursuit have little time to consider how best to improve upon their system of procedure. Nor are they disposed to admit that improvement is possible, even while convinced that improvement is desirable. They cannot take an outside and impartial

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view of their position. The required change is generally made from without. There were engineers before the time of Watt, but none of them thought of making the improvements which he effected in the steam engine, and some of them did their best to denounce those improvements as visionary.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Phosphatic Bread.

Messrs. Editors:—In your issue of August 21, page 119, your correspondent, B. H. J., is perplexed with the disagreement of the "doctors" respecting Horsford's phosphatic bread.

As regards the simple disagreement it need not surprise us, for as long as people have different modes of thought we shall always find them giving us diversified and conflicting theories in relation to matters which are but imperfectly understood. The subject of Prof. Horsford's bread is one of very general interest, involving, as it does, the health and happiness of all who use it, and is well worthy of scientific and physiological examination. The writer does not grasp his pen with the idea of deciding the controversy between the doctors, but he may be allowed to add the other line of the couplet—

When doctors disagree,
Disciples then are free.

And each person must decide for himself according to the teachings of common sense.

There is one point in connection with bread making on which the doctors do agree—namely, that wheat flour in its natural state, unbolted, contains all the elements of nutrition, and when made into bread is a perfect food. But some people think that bread must be white, therefore they take out the most important parts—the nitrates and phosphates, or muscle-making and brain-feeding elements. The object to be gained by the use of Prof. Horsford's preparation is to restore to the flour the phosphatic elements sifted out with the bran and still leave the bread white. Now the question is, Can this chemical preparation be perfectly similar to the phosphatic elements as they exist in the grain in its natural state?

We believe the doctrine of Dr. Bellows, who maintains that they are not assimilated by the living organs or appropriated as food, but are rejected as poison. We must consider that the laws relating to life are but very imperfectly understood; also, that chemical law and vital law do not always sustain such mutual relation to each other as we might suppose. No one believes that nitric acid is a healthy article of food or that it might be used as a substitute for beefsteak, yet it is known that nitrogen is the basis of both. In the beefsteak it is organized, while in the nitric acid it is not, and this makes the difference between healthy food and actual poison. If it were possible for us to chemically manipulate soils and fertilizers in such a manner as to obtain nutritious extracts suited to stomachs and capable of building up the organs of human beings we never need be in dread of famine. It may be set down as a principle of animal life that it can never assimilate or vitalize inorganic matter. If we must use white bread let us use it without drugs and supply lost elements by using along with it other articles of food containing them in sufficient quantity to compensate for the loss. J. R. Parks.

Muscatine, Iowa.

[Where does our correspondent get his authority for the statement that inorganic matter cannot in any instance be assimilated by the animal organism? How about the salt used in food? How about the iron administered in medical practice to those whose blood is deficient in iron, the result of which is directly apparent in the hightened color of the lips and cheeks, and also in the examination of the blood itself? It does not answer to propound general laws that conflict with such ordinary facts as these.—Eds.

Nicotine in Lockjaw.

Messrs. Editors:—In answer to the correspondence in the current volume of the Scientific American, No. 9, page 134, it may be allowable to state that the treatment of lockjaw, or tetanus, by tobacco is by no means new. Dr. Wood, in his "Practice of Medicine," vol. II, page 833, says: "Many cures, said to have been effected by this powerful sedative (tobacco), are on record; and it is perhaps among the most efficacious remedies in tetanus."

There are two forms of this disease; idiopathic tetanus, or that which arises spontaneously in the system, and traumatic tetanus, or that which results from wound or injury, both equally characterized by a progressive and permanent rigid contraction as well of the muscles of the legs and trunk as of the jaw. The former may arise from the action of cold upon the body, and is generally curable; the latter is exceedingly fatal. Tobacco, or its extract, nicotine, has also been used in poisoning by strychnia, the effects of which in poisonous doses may be considered as a variety of tetanus.

In 1856, Prof. Haughton laid before the Royal Irish Academy the results of experiments tending to show that the physiological action of nicotine and strychnia were counteractive of each other; and in 1858, Dr. O'Reilly, of St. Louis, Mo., related the successful treatment of strychnia poisoning by the administration of an infusion of the dry leaves of tobacco.

In the *Medical Times and Gazette* for October 25, 1862, will be found an account of two cases published by Prof. Haughton himself. In one, a case of tetanus, caused by a severe burn, "the man was evidently dying when the nicotine was given. It produced an immediate relaxation of the tetanic spasm of the muscles of expression, of respiration, and deglutition, relief from an agonizing pain, and a lowering of the pulse from 130 to 88 per minute. The nicotine was given in one-drop doses." The other case "was one of idiopathic, subacute tetanus, produced by exposure to cold. In this instance the patient recovered, after having taken, during eleven days, 44 drops, or 26·4 grains of nicotine."

In regard to the application of tobacco in strychnia poisoning, may be cited the case of a boy who had taken an estimated quantity of 4 grains of strychnia, as described by Dr. Smyly. "When I arrived he was lying on his back, his head thrown back, chest raised and fixed, limbs rigid, hands clinched, eyelids spasmodically closed. * * * I had an infusion of tobacco made by pouring a pint of boiling water on about an ounce of cut Cavendish. * * * Cold water was added until the liquid was tepid. I made him drink two thirds of this. Violent vomiting followed. He lay quietly on his back for about five minutes, when he was seized with a violent spasm. * * * I gave him another pint of the infusion in three doses, all followed immediately by vomiting. Another pint was prepared from the same ounce of tobacco; about a teacupful of this was retained in the stomach for about five minutes; a second was retained somewhat longer. Profuse sweating now commenced, and he slept for a short time. I left him for about half an hour. On my return I found him lying quietly on his back, all his muscles, except those of his legs, relaxed; breathing less rapid; pulse slower, etc. I turned him on his side, which he was afraid to do himself. He drew up his knees, put his hands under his head, and went to sleep." The boy made a rapid recovery. G. W.

Baltimore, Md.

Broom Corn in the South.

Messrs. Editors:—Broom corn has become a crop in the South. The great trouble is to get machinery to clean the seed from the brush after it has been cut. I will be obliged if any of your correspondents will write me giving information where I can purchase such a machine.

Broom corn is now worth three hundred dollars per tun, and an acre of ground will produce from half a tun to a tun—the former is a fair average. A hand with a plow and team of mules or horses can cultivate forty acres, though more help will be required to cut, haul, save, and prepare for market.

Cannot some of your contributors to the Scientific American give an essay on the manner of cultivation—whether to drill or step drop—the number of stocks to be left; in fine, all the necessary information, from the planting till the crop is ready for market? It will be of great value and assistance to the farmers of this country, where, till recently, the cultivation of cotton was all that was thought of or cared for.

Benj. Roach.

Natchez, Miss.

Small Steam Power Wanted.

Messrs. Editors:—I was delighted to observe in No. 4, current volume of your journal, a partial description, by Mr. Charles Boynton, of a small steam engine for household use. The great need of such a power is sufficiently manifest, and the mechanic who will furnish a good one may be assured of substantial reward.

It appears to me that, to attain success, three conditions are of indispensable necessity: First, absolute safety; second, simplicity of construction and management; and third, the utmost lightness consistent with the required power. Absence of noise in running would also be a valuable quality.

I cannot agree with your correspondent that a half-horse power engine "will fill the bill." Less power would suffice for some; others will require that of at least two horses. In the smaller sizes a furnace may be dispensed with, and its office fulfilled by a set of lamps. Boilers of steel would be preferable to those of iron. Compared to these advantages, price would be a matter of secondary consideration; yet a low scale of prices would ensure large sales.

The uses to which a low power could be applied with advantage are almost innumerable; but if we consider only the running of the washing and sewing machines—the latter of which are now rapidly killing the women of our land—the demand for it should be enormous. Many will await with impatience the announcement that such an engine is in the market; and, when the Scientific American shall have passed favorable judgment, its success will be certain.

Troy, N. Y. P. J. McCort.

An Old Portable Railway.

Messrs Editors:—In your issue of July 31, is a notice and a view of "Petelers' Portable Railroad." About 1827, I was then about fifteen years old and resided at the foot of Morris street, then called Beaver lane. West street was not complete and did not extend below Cedar street. The Battery had just then been enlarged from about Greenwich street. At the foot of Beaver lane there had been about two acres reclaimed, upon which was a coal yard; Lehigh coal was just then coming into domestic use, and this yard received large quantities of coal, brought there by schooners from the Schuylkill, which was placed in piles or heaps ten or twelve feet high. In order to get it in the remote parts of the yard wheelbarrows were used at first, but that was slow work. There was at that time in the employ of the coal company a young man whose name I have forgotten, who got up a system of railways somewhat similar to "Petelers'." The coal was hoisted from the vessels by a crane in tubs holding six bushels each, which tubs were set upon a small rail car, swinging upon round bars and easily dumped. The cars ran upon sections about twelve feet in length, made of stout scantling with three cross-ties mortised in them, one at each end and one in the center; upon the sections stout strap iron was fastened; the ends of the sections were fastened together by an iron clasp hooking over staples and keyed; the railways were then ready for use. The railway was placed at any hight desired by placing beneath it frames or horses made for the purpose, and the cars with their loads ran to any part of the yard desired. The whole arrangement was taken up and laid down or altered easily and with very little labor. It must be remembered the use of railroads was but imperfectly known in the United States at that time, and all these things made a lasting impression on my young mind. This system is a very good one for all local uses.

Chattanooga, Tenn. E. Newby.

Crumbling of Pistons.

Messrs. Editors:—Several instances of the deterioration of the material in steam cylinders mentioned by your correspondent, George S. Pierce, in your issue of the 28th Aug., have fallen under my observation. In one of these a cylinder bottom was burst out, and the fragments were found so friable as easily to be crumbled between the fingers. The explanation you give is undoubtedly the true one, and the reason such accidents do not oftener occur is because engines are not usually worked with so high a temperature of steam as to produce the result. The case mentioned occurred in an inclined engine on board a small steamer called the *Sue Eaves*, a tobacco boat on the Green River, Kentucky. The cylinder being too small for the power required, it was necessary to carry very high steam. So far as my observation extends, such accidents occur only where high steam is used, or where the steam is superheated. Where the steam is used expansively there is always more or less water in the cylinder from condensation (except in jacketed cylinders), and this water seems to retard, if it does not wholly prevent the deterioration of the iron. Crude oils should never be used in steam cylinders. Pure tallow is a better lubricant, and requires much more heat to decompose it. In cases where it is necessary to use very high steam it were best, perhaps, not to use liquid lubricators at all. Pulverized black lead and soap-stone have been used to advantage, and cannot produce the evil spoken of. Black lead is carbon, but it is not liquid, cannot penetrate, and has no action on the iron. According to the old chemical maxim *Corpora non agunt nisi soluta.* Dry lubricants should be reduced to exceedingly fine powder and contain no grit. Their use induces considerable wear at first, but the wearing parts soon become covered with a very hard, smooth scale, after which there is no appreciable wear.

Newark, N. J. R. D.

Improved Wooden Horse Collars Called For.

Messrs. Editors:—I occasionally get at the columns of your paper and am always interested in them. Passing a few days here, I read your number for the last of July and Aug. As a planter, I am always pleased with anything pertaining to farm improvements.

Of such is Mr. Meyers' horse collar, a picture of which is in the 31st of July No., and it may be a good thing—it looks promising.

I want to tell you how we plowed thirty years ago in old North Carolina. We used home-made wooden hames or wooden collars, and they never hurt a mule or horse. If some of your inventing friends would improve a purely wooden collar, it would be a great help to planters. My neighbors, in Texas, have made crops for some years with wooden collars, and no collar can beat them, only they are not handsome, and are a little too heavy. But they need some improvement to be generally used. They could be made very cheap. Will you call the attention of inventors to these views? They may be fruitful of some good. Thos. S. Wilson.

New Orleans, La.

The First Circular Saw.

Messrs. Editors:—I send you the remains of a round saw which I made in the year 1813 or 1814, when not over 13 years of age. It has been lost many years, but last spring was found while working my garden.

I send it to you, not for its intrinsic value, but for its antiquity, claiming that it is the first circular saw ever made or used in America. My father, the year this was made, inquired of all the hardware merchants in Albany and Troy for such a saw, but no one there had ever seen or heard of such an article.

This was made of sheet iron, attached to a wooden shaft, used for splitting ½-in. bass-wood boards for old-fashioned wheel rims, made 2000 revolutions per minute, and, we all thought, performed most admirably. My father, immediately copying mine, made one from the wide part of a broken hand-saw, which, although almost worn out, is still in good working order. Now, if you think my claim, as the young inventor of the circular saw, is unjust, please correct it from any authentic records in your possession of an earlier date.

Lemuel Read.

North Brookfield, N. Y.

[Messrs. Hoe & Co., of this city, have been engaged in the manufacture of circular saws for 40 years, but, so far as we are aware, our friend Read is at the top of the heap in antiquity.—Eds.

Smooth Cutting Edges for Reaping Machines a Fallacy.

Messrs. Editors:—I was very much surprised to notice one of your correspondents, in Nos. 5 and 8, current volume, advocating smooth cutting edges in reaping machines. Now, I have had fifteen years' experience in using reaping machines, and I have never yet seen a dull serrated sickle section that became so by cutting grain alone.

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I have a machine, now, that has been in use six years, and has cut from 60 to 80 acres of grain a year, and yet the sickle sections are as sharp as ever, except those that have come in contact with stones and other hard substances. I believe that the smooth edges would cut just as well, so long as they remained sharp, but they would, and do, get dull so easy that the difficulty of keeping them in repair is the reason they are not used for cutting grain.

Your correspondent ought to know, that serrated sickle sections are made as hard as it is possible to make steel, and if they come in contact with nothing but straw, they will last a lifetime, whereas the smooth-edged cutters must be made softer, so that they can be ground when they become dull.

I think it is unfair to call the makers of reaper knives idiots and lunatics, when, really there is so little fault to be found with them. There is more room for faultfinding in the way the other parts of the machines are made. For instance, the use of cast iron where wrought should be used, and wrought iron where steel should be used. In fact, reapers should be as light as possible, and yet be strong. I have seen reaping machines that looked almost strong enough for a saw mill, and yet come to grief very soon. They were so heavy that their own weight broke them to pieces in drawing them over the ground. H. MARTINSON.

Hawksville, Ontario.

DYEING SILKS---PREPARATION OF THE RAW SILK PREVIOUS TO DYEING.

WRITTEN FOR THE SCIENTIFIC AMERICAN BY DR. M. REIMANN, OF BERLIN.

Supposing it is required to dye 100 lbs. of raw silk, 12 lbs. of soap are boiled with a sufficient quantity of river or rain water until all the soap is dissolved ; the water is then allowed to cool a little and the silk is introduced ; it is allowed to remain in the solution of soap 1½ hours, the liquid in the meantime being kept at the boiling temperature. The silk is then wrung dry, put into linen bags, and once more introduced into a solution of 12 lbs. of soap. It is once more boiled for 1½ hours, and finally washed in the river.

PREPARATION OF SECOND-HAND SILK STUFFS.—The silk is cleaned in a warm solution of carbonate of soda, then boiled for an hour and a half in a soap bath, and washed in the river. It is next placed in water acidulated with a little sulphuric acid, and suffered to remain in it until the original color has wholly disappeared. It is then washed finally in the river.

TO DYE SILK BLUE.—The silk is immersed for some time in a solution of alum, which serves as the mordant. Meantime a solution of indigo carmine in boiling water is mixed with warm water in a suitable vessel. In order to dye 10 lbs. of silk ¾ lb. of indigo is requisite. The silk is immersed in this bath until the requisite shade is obtained. It is then wrung out and allowed to dry in the shade.

In order to give a deeper tint to the material, the silk is passed through an indigo vat. In this way the deepest tints may be obtained.

TO DYE SILK GREENISH BLUE.—In order to dye 10 lbs. of silk, 1 lb. of alum is dissolved in a sufficient quantity of water to completely cover the silk ; ½ oz. of sulphuric acid is then added, and the silk is allowed to remain 4 hours in the bath. It is then taken out and wrung dry. A solution of ½ or ¾ lb. of indigo carmine in warm water is then added to the alum bath, well mixed by stirring, and the silk once more introduced. It is suffered to remain in the dyeing bath until a sufficiently dark shade has been obtained. It is then taken out, wrung out, dried, and completed. In order to obtain a uniform color the indigo is gradually introduced into the bath.

A REDDISH-BLUE DYE.—In order to dye 10 lbs. of silk ½ lb. of protochloride of tin is dissolved in water, and to this solution are added 2 lbs. of solution of nitrate of iron and 1 oz. of sulphuric acid. The mixture is allowed to stand a day and the clear portion of the liquid is then poured into a sufficient quantity of water. The silk is submitted to the action of the mordant thus obtained for half an hour. It is then wrung out, washed in river water, and finally dyed in a bath containing ¾ lb. of yellow prussiate of potash and ½ lb. of sulphuric acid.

The dyeing operation should continue a quarter of an hour. The silk is wrung out, introduced once more into the mordant bath, then dyed as before, and so on until the shade obtained is dark enough. When this is the case the silk is washed, dried, and finished.

YELLOW DYE BY MEANS OF WELD.—In order to dye 10 lbs. of silk, 3 or 4 lbs. of weld are boiled in water for 20 minutes; the decoction is then filtered through linen and suffered to cool a little. The silk is then boiled as before with one fifth of its weight of soap, then allowed to remain some time in an alum bath, and finally introduced into the above-mentioned weld decoction. Here it is worked about until it is uniformly dyed. A little carbonate of potash may be added to the weld bath in order to vary the shade a little. The yellow tint obtained from weld is sufficiently deep.

YELLOW DYE BY MEANS OF QUERCITRON.—In order to dye 10 lbs. of silk, 5 lbs. of quercitron bark are boiled with a sufficient quantity of water ; the clear decoction is then poured off, and the silk previously mordanted by alum is immersed in it for half an hour and then washed. By varying the amount of quercitron and adding crystals of soda, various shades of yellow may be obtained.

It is a good plan to add some gelatine to the decoction of quercitron before making use of it, as in this way the tannic acid contained in the quercitron bark may be removed from the liquid.

BRIMSTONE COLOR BY MEANS OF PICRIC ACID.—Picric acid is very often employed at the present day to give a light yellow tint to silk. With regard to the nature of picric acid, it is one of the products obtained from coal tar.

Among the products obtained by the distillation of coal tar at a temperature varying from 150° to 190° Centigrade, is an oil which contains a considerable quantity of carbolic acid.

The benzole being the hydride of phenyl $\underbrace{C_{12}\ H_5}_{\text{phenyl}}\ H$, the carbolic acid is the alcohol $\underbrace{C_{12}\ H_5}_{\text{phenyl}}\ O + HO$, but is indued with acid properties.

On treating the oil containing carbolic or phenic acid with solution of soda, decanting the clear solution of phenylate of soda and adding sulphuric acid to it, an oil is obtained which when distilled and dried, furnishes crystals of pure phenic acid. This substance, when heated with nitric acid, readily furnishes products in which hydrogen is replaced by the complex atom NO_4, or subnitric acid.

On heating phenic acid with three equivalents of nitric acid, a product is obtained in which three equivalents of NO_4 have taken the place of three equivalents of H, thus

$$C^{12}\ H^5\ O + HO + 3NO^5 = C^{12}\ H^2\ O + HO + 3HO\ (NO^4)^3$$

The whole mass has the appearance of a yellow crystalline paste, which, on being dissolved in boiling water and recrystallized, furnishes yellow crystals to which chemists have applied the name "trinitrophenic acid." In commerce it is called "picric acid," " Welter's bitter," and " picronitric acid."

In a state of purity it is a yellow crystalline substance, having a very bitter taste, and soluble in cold water, which has a brimstone yellow tint when holding this substance in solution. All animal substances when dipped in this solution of picric acid are dyed yellow. Therefore, the the silk has only to be introduced into a solution of the acid containing for every 10 lbs. of silk to be dyed 2 ozs. of picric acid, when a fine brimstone shade will be readily obtained.

The color easily resists the action of sunlight and of air but readily disappears on washing with soap or even with clean water. Therefore the silk must never be washed after dyeing, but merely dyed in the solution and then finished.

The yellow color produced by picric acid may be easily discovered by applying the tongue to the dyed article. The exceedingly bitter taste is a satisfactory proof that picric acid is deposited on the fibers.

YELLOW DYE PRODUCED BY ANNOTTO.—In order to dye 10 lbs. of silk, ½ lb. of annotto is boiled for half an hour with a solution of ½ lb. of carbonate of potash and a sufficient quantity of water. The silk is introduced into this bath and well worked about, while the temperature of the bath is kept close upon the boiling point, though never actually boiling. The requisite shade having been obtained, the silk is washed, then heated at 40° or 50° Centigrade with alum, in the solution of which it is allowed to remain a night. In the morning it is again washed and dyed a second time in a bath at a temperature of 30° Centigrade, which contains a decoction of weld and a quantity of the soap used before for the purpose of cleaning the silk. The dyeing operation is effected by passing the silk seven times through the bath.

The above-mentioned weld decoction is prepared by boiling 20 lbs. of weld with 10 gallons of water and ½ lb. of carbonate of potash. The silk, when sufficiently dyed, is passed through a soap bath containing 3 lbs. of white soap.

AN ORANGE DYE.—In order to impart an orange tint to 10 lbs. of silk, 1 lb. of annotto and 3 lbs. of carbonate of soda are boiled with water. The solution thus obtained is filtered and the silk worked about in it for half an hour. It is then wrung out, washed in the river, dried, and finished.

A BLACK DYE.—This most important color is obtained as follows ;

1. BLUEISH-BLACK.—Todye 10 lbs. of silk blueish-black 2 lbs. of alum are dissolved in 20 lbs. of boiling water. This solution is then added to a sufficient quantity of cold water. The silk is then introduced, worked about some time, and allowed three hours in the solution. Meantime ⅜ lb. of sulphate of iron is dissolved in water, and the solution added to a bath of warm water, and the silk, removed from the alum bath, is introduced into it. It is worked about here for a quarter of an hour and then washed.

The dyeing bath is prepared as follows :

Five pounds of logwood in powder or small chips are placed in a bag and boiled in water until all the coloring matter is extracted. The bag with the wood is then removed from the water, and a decoction added consisting of ⅜ lb. of barrel soap in water. Having added the needful quantity of water, and varied the temperature of the bath so that the hand can be put into it without injury, the silk is introduced and worked about in it for twenty minutes. It is then washed and finished. If the color is still not dark enough the silk must be immersed in a fresh logwood bath.

Demand for Immigrants in the South.

The following extracts are from the work on " Cotton culture and the South," noticed under the head of " New Publications :"

" No possible growth in the labor now there can answer the cry which comes from all sides for ' more capital, more labor ; money to build up towns, to establish factories and railroads ; money to buy more and better stock and tools ; men with brains and energy, and muscle to work them.'

" Expressions like the following repeat themselves in almost every letter we receive, and from every portion of the country :

" 'Black laborers seem to be passing away ; we need capital, capital, capital, and reliable labor ; I must acknowledge the blacks are greatly improving in their habits of industry, if we could keep mean northern people away from them, who intoxicate them with fabulous tales.'

" ' Immigrants are wanted by all, and from every quarter ; mechanics, artisans, and workers of all trades,—men to till the soil.'

" ' Honest, industrious, and intelligent laborers are needed, and good fertilizers, good and improved tools and capital ; until we are supplied with intelligent labor, we can make but little improvement in farming. Negroes know very little about the use of machinery, and are too careless to be entrusted with it. We have no caterpillars or army worms here in Tennessee.'

" 'We need everything but land and climate,—capital, management, and ambition, muscle—in other words a plenty of the article, " live men." The soil and climate call loudly for workers.'

CHINESE LABOR.

" With regard to Chinese labor, time and actual trial alone can prove whether it be practicable and economical. The dangers of the coolie system are its turning into a system of permanent peonage or slavery—systems which the old world is discarding, not entirely from motives of right, but also from conviction that they are the worst economy, adverse to both the social and material progress of the communities in which they exist. If men are to be treated as mere tools, perhaps slavery, through the selfish interest of the owner, secured the better care for that health and comfort which went so far to make good the working trim of his slaves ; but the voice of the people has been decisive on this subject in the late war, and no system, we believe, can ever be permanently inaugurated in this nation except under laws securing to all laborers the privileges of freedom. If ever coolies are introduced we may be sure there will be the strictest legislation relative to contracts,—legislation resembling perhaps the English, but in no respect permitting the abuses existing under the Spanish or French laws.

" As citizens we may, however, question the expediency of flooding the country with a population, which—if we may judge, we trust without harshness, from what we have read and have gathered from conversation with those who have had actual experience with this class of labor—though it would contribute vastly to the labor force, might bring with it many demoralizing vices that could only be a tax upon the moral force of the country.

" But, in treating the cotton question purely as one of economic science, and not in its connection with morals, it must be admitted that so far as their qualifications as laborers are concerned, there is probably no race so well fitted to meet all the requirements of cotton cultivation as the Chinese.

" Cotton requires persistent industry, nimble and dexterous fingers in the picking season, and the crop is made more by saving than by hard labor ; all these needs are exactly met by the Chinamen. At the same time he will live in the most satisfactory manner upon rice and other vegetable food, all of which he can raise while cultivating the cotton crop, and he will thrive in the climate of the river bottoms, which, whatever may be claimed for the uplands, cannot be said to be conducive to great vigor on the part of white laborers.

" Such being the facts, when we consider that the fertile cotton fields of Arkansas, Louisiana, and Texas, have never yet been cultivated in cotton to the extent of two acres in each hundred ; that these fields have been brought by the Pacific railroad within sixty to eighty days distance of an unlimited supply of labor, and that this distance can be bridged at small expense, it would seem strange indeed if supply and demand did not respond to each other.

" It may be added that the Chinese laborers who have built the Central Pacific railroad, were procured under contract, which did not come within the prohibitions of our coolie law, but they came over under a system of advances well secured by those who promoted their immigration, but which left the laborers to all intents and purposes free.

An Ingenious Invention.

An invention has been produced in Paris for settling disputes between cab hirers and cab drivers, which seems to deserve attention. According to the account of it which we have received from a correspondent, the " compteur méchanique," or calculating machine, not only reckons the distance traversed, but indicates as well the exact sum of money due to the driver. Two dials are fixed on the back of the driving seat ; one contains a clock, while on the other the distance traveled is indicated by a hand acted on by the wheels ; it is entirely beyond the control of either cabby or his "fare." The apparatus is put in and out of gear by the lowering and raising of a lever bearing the word " libre" which is only visible when the cab is empty and the " compteur" consequently unemployed. There is no danger of the driver omitting to lower this lever as soon as he is hired, it being evidently his interest to have the greatest possible distance paid for ; while, on the other hand, it would be useless for him to try to make a fictitious fare by driving about with his "compteur" in motion, for a card in the interior of the machine registers the distance traversed during the day, and the money to be accounted for to the cab owner. The great difficulty has hitherto been to find a means of marking the time spent in visits, shopping, blocks in the streets, etc., when the wheels and the tell-tale are necessarily at a standstill. M. Bruet, the inventor of the new register, has now overcome this difficulty by an ingenious contrivance, by means of which, as soon as the wheels cease to act on the indicator, the clock which forms part of the machine, keeps the tell-tale hand moving at a rate which credits the driver with eight kilometers (about five miles) an hour, or two francs, according to the Paris tariff.

THE term freestone has been applied to any stone which can be wrought with the mallet and chisel or saw. In this country it is popularly applied to brown sandstone.

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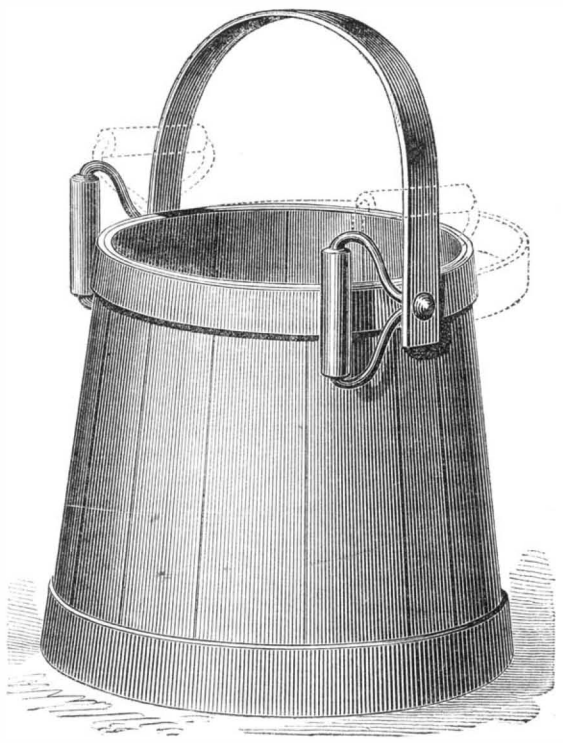
IMPROVEMENT IN BUCKETS.

This invention illustrates the fact that even in articles of common and universal use there yet remains opportunity for improvement. Who would have thought there could yet be a useful modification of the form of the bucket. Improved machines for its manufacture, for cutting staves, heading, etc., might well be expected; but the thing itself was generally supposed as perfect as it was possible to make it.

Nevertheless, here we have a real improvement, the object being to enable two persons to comfortably and easily carry a large bucket when filled with a heavy fluid, when the labor of one is not adequate to the purpose. The invention is simply a combination of handles with the ordinary bail, and



is equally applicable to all sorts of bailed vessels, as pots, kettles, etc., which have hitherto required the use of the bail.

By reference to the engraving it will be seen that when the bail is in use the handles are turned down out of the way, and when the handles are employed the bail is turned down. The device is extremely simple and cannot fail to be useful.

Patented through the Scientific American Patent Agency, June 1, 1869, by John H. Tomlinson, of Chicago, Ill.

Hell Gate Obstructions.

We learn from the Brooklyn *Daily Times* that, as the Shelburne plan of drilling and blasting the rocks at Hell Gate has failed, there are capitalists ready and willing to risk large sums upon the success of the apparatus invented by Mr. Samuel Lewis, illustrated and described on page 385, Vol. XX, of the Scientific American. That paper has no doubt that Mr. Lewis and his supporters will guarantee the removal of the obstructions for half the estimate made by General Newton on the tunneling project, which, it asserts, is a pet scheme of General Newton's.

If these statements are correct, it would seem only reasonable that the invention of Mr. Lewis should be tried, and, if found to answer the expectations formed in regard to it, allowed to proceed with the work.

The *Times* charges that General Newton is so in love with his own project that he is incapable of forming an impartial judgment on the merits of Mr. Lewis' plan. We are sorry that this should have been said, or even thought, as we believe it is unjust to General Newton, and may be injurious to the interests of Mr. Lewis, who, we are confident, does not entertain the opinion expressed by the *Times*. We trust that for the satisfaction of all parties, a trial of Mr. Lewis' invention will be permitted.

Application of Leichtenberg's Experiment to the Mineralogical Analysis of Rocks.

M. S. Meunier proposes to make use of the well-known experiment of Leichtenberg's electric figures to separate from each other the divers mineralogical constituents of some kinds of rock. We briefly remind our readers that the experiment alluded to consists in charging with electricity a cake of resin or sealing wax, by means of a previously-charged Leyden jar; it is thus possible to charge certain portions of the cake with positive, others with negative electricity. In order to exhibit this to sight it is usual to blow, by means of a small pair of bellows, on to the cake of the resin, a mixture of very finely powdered red lead and sulphur; the friction, on leaving the nozzle, causes the powders to become electrified, and the sulphur being negatively electric is attracted by the curved figures positively electric on the cake, while the red lead follows the opposite course. M. Meunier has tried thus to separate sulphur-bearing trachite into its mineral constituents, and succeeded perfectly in getting the sulphide and feldspar from each other; he states that he has equally well succeeded with rocks made up of two different silicates.—*Cosmos.*

IN England a huge steam hammer, weighing 1,000 tuns, is being made for the Russian Government. The hammer head weighs 42 tuns, the anvil block 500 tuns, and it is to be used in forging steel guns.

FIRE AND RAT-PROOF BUILDINGS.

Our readers will be prepared, by several articles which have lately appeared in the SCIENTIFIC AMERICAN, upon the subject of fire-proof and rat-proof buildings, to examine critically the device herewith illustrated.

The inventor has spent three years in experiment and study to perfect this system, and, while primarily aiming only to perfect a system of fire-proof building, now claims that he has secured several important results not at first contemplated. One of these coincident results is the rendering of a building rat-proof as well as fire-proof. A second is, that a very superior wall to that formed by plastering on wooden lath is obtained; the cement or plaster not drying out rapidly, but retaining its moisture until a perfect chemical combination has taken place between the materials of which it is composed. The plaster is found, after it has hardened, to be four times as hard as common plastering. The peculiar form of the iron laths also prevents the falling down of any portion of the plaster from any ordinary cause, or from the action of great heat. Great pains have been taken to bring the cost of this method down to such a figure that it can successfully compete with the ordinary materials and methods of building. The inventor informs us that this has been so far accomplished, that the cost for fire-proofing a floor—which also answers for deafening it, is not so much as that of wood used for deafening or "pugging."

The features of this invention will be easily understood by the aid of the accompanying engravings. Fig. 1 is a sectional view of the upper and under side of a fire-proof and rat-proof floor with intervening joists and spaces, and also of a vertical wall with sections of lath and concrete.

Fig. 1

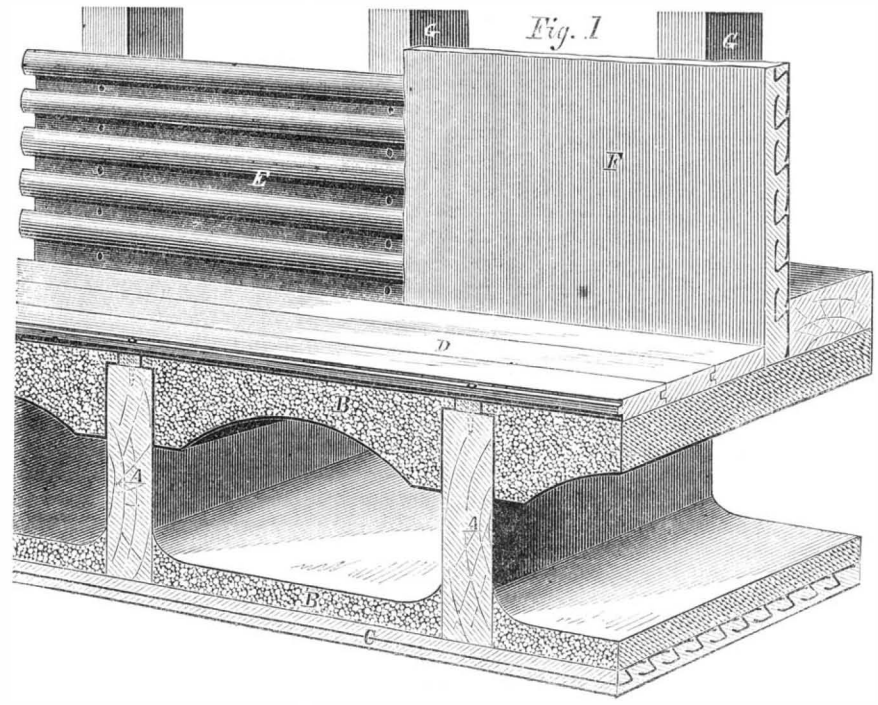
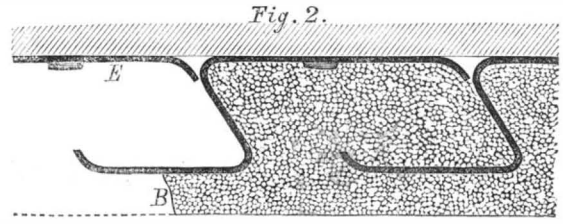
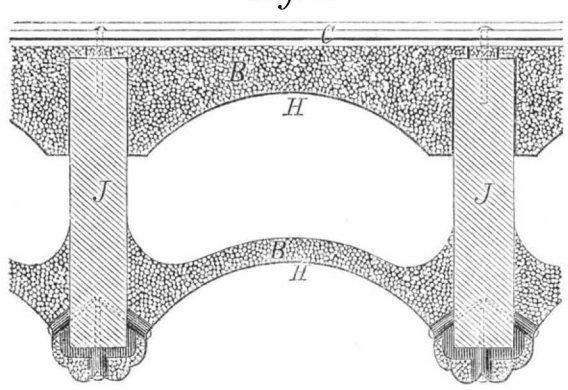


Fig. 2.



In this engraving the joists are lettered A; B is the concrete; C the lath and plaster, or ceiling, on the under side of

Fig. 3.



the floor; D is the floor; E the iron lathing; F the plastering; and G the studs.

Fig. 4

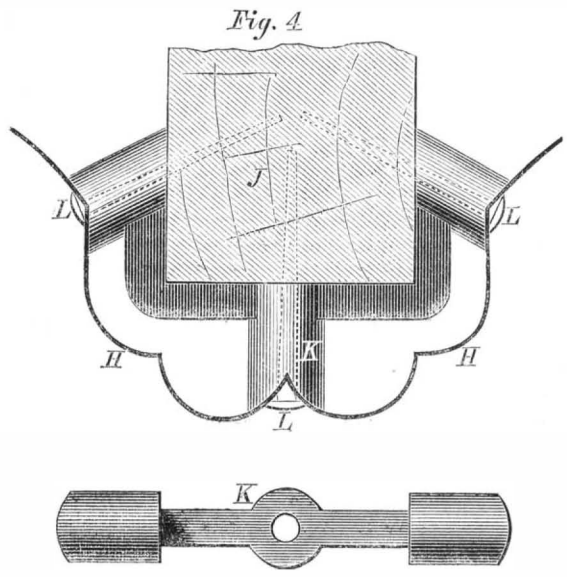


Fig. 2 is a section of the iron laths and the plastering, showing the peculiar form of the laths and the manner in which they support the plastering.

Fig. 3 is a section of flooring and metallic ceiling for manufactories, etc., in which the letters H represent, respectively, a metallic arch with rib moldings, and also a metallic arch to support the concrete underneath the flooring; J the joists, and C the flooring.

The method of putting on the metallic ceiling is shown in Fig. 4, in which H represents the metallic ceiling, J the joists, K the firring-off clamp, L the nails which secure both the metallic arch and clamp.

The whole system will now become perfectly plain to all who have the least knowledge of building, and we think it must be obvious to every candid reader that neither fire can consume, or rats penetrate, a wall of this construction. The basis of these walls is wood, but wood so protected from the external heat, that only a fire of such intensity as to convert the timbers into charcoal, could weaken the main structure. Such an effect could scarcely be produced by the burning of anything but large quantities of the most concentrated fuel inclosed in a building for a long period. The term fire-proof, as applied to buildings, can only be understood to mean proof against the destructive action of fires such as can occur in and around buildings in the course of the ordinary business of life. From what we can judge of this system we think it promises as well, certainly, as any of its rivals; and as the inventor states some ten or twelve first-class buildings are to be erected this season on this plan, its efficacy is evidently believed in by those who are qualified to decide upon its merits.

This improved system of constructing fire-proof building has been made the subject of three patents, viz., January 26th April 13th, and May 4th, 1869, by Edwin May, of Indianapolis, Ind., who should be addressed for further particulars.

Joint Exposition of the Wool Industry of the United States, at the American Institute, in the City of New York.

The coming exhibition of the American Institute, which will open on the 8th September and close on the 30th October next, bids fair to be the best exposition yet held by this Association.

A feature of great interest is foreshadowed in the following notice published by the Executive Committee of the National Association of Wool Manufacturers: All American manufacturers of goods composed wholly or in part of wool, and of supplies, machinery, and tools, used directly in the wool manufacture, are invited to exhibit samples of their manufactures at the Joint Exposition of the Wool Industry of the United States, to be held under the auspices of the American Institute, in the city of New York, by the National Associations of Wool Manufacturers and Growers. The place of exposition, on the corner of Sixty-third street and Third avenue, will be open for the reception of goods on the 1st of September next, and is now open for the reception of machinery.

Manufacturers who have agents, or commission houses in the city of New York, are advised to forward their goods through such agents or houses, and to devolve all the charge of their goods upon them. Articles forwarded from other places must be directed to "Wool Industry Exposition, care of N. Kingsbury, Superintendent, corner of Third avenue and Sixty-third street, New York." The name and residence of the exhibitor, and list of contents, must be marked on the package, the freight and other charges upon which must be prepaid to the place of exhibition. All goods should be forwarded to the Exposition rooms on the 1st of September, or as soon thereafter as possible.

Persons desirous to exhibit, who have not already given notice of their intention, are requested to give such notice immediately to N. Kingsbury, Superintendent, care of American Institute, New York city, or to John L. Hayes, Secretary, Boston, Mass. The notices of intention to exhibit already received, place it beyond a doubt that this will be the most brilliant exposition of the products of a single industry ever seen in this country. Every manufacturer should take pride in contributing to its success, and doing his part to demonstrate the capacity of the United States for industrial independence. Let every mill send a specimen of its products.

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BUSINESS HINTS.

The last number of *The Engineer*, now before us, contains eighteen pages of advertisements. This leads us to remark that the English are without doubt the most systematic advertising people in the world, as the columns of all their leading journals bear evidence. The *Times, Daily Telegraph*, and others of the great London journals enjoy an advertising patronage which would surprise many go-ahead Americans. There is much meaning in the fact, for it is beyond belief that the practice of advertising, day after day, and week after week, would be continued by shrewd business men unless it brought a good return.

We have heard it said that a business man in England expected to spend every year in advertising as much as he paid out in store or shop rent. This is true to some extent in this country—indeed we have hundreds of business men in this city who owe their greatest success to a judicious system of advertising. A. T. Stewart, for example, has always been an extensive advertiser, and old Stephen Girard declared that he not only advertised when business was good, but he also pursued the same system in dull times as the surest way to make things lively.

Local journals are good for local advertising, but if the manufacturer and trader wish to make their wares generally known, they must, of necessity, select for that purpose journals that circulate extensively throughout the whole country. If advertising does not pay, the parties have only themselves to blame, when they select for that purpose journals of small circulation. Messrs. G. P. Rowell & Co., of this city, in their American Newspaper Directory, publish what they they call "The Excelsior List," that purports to give the circulation of many of the leading journals. In the New York city list there are but twelve weekly papers that claim to have 30,000 circulation.

The SCIENTIFIC AMERICAN is put down at 35,000, and ranks as one of the best advertising mediums in the country. Our circulation is understated, as we are now printing 75 reams of paper each week, or equal to 36,000 copies. If advertisers will take character as well as the extent of circulation into consideration they will find that the rates of the SCIENTIFIC AMERICAN are lower than any other journal now published, not to speak of some other papers that have scarcely a recognized existence beyond the office of publication.

HEAT AND WORK.

In an article published on page 105 of the last volume, we endeavored to show that whatever work was performed by the mass motion of a steam engine was a subtraction from that mass motion, the mass motion itself being a subtraction from the heat of the steam. Some correspondents have either failed to recognize the truth of the proposition laid down in the article referred to, or they do not understand it. The following query will illustrate:

"Why will not the exhaust steam from an engine impart to water the same amount of heat it contained when it entered the cylinder, minus that radiated from the cylinder during the stroke?"

This correspondent has been experimenting as follows: He estimates from standard formulæ the amount of heat in the steam entering the cylinder of his engine at each stroke, and the radiation from his cylinder during the stroke, and finds that the number of units of heat imparted to the water used for condensation, falls short of the amount contained in the steam when admittted to the cylinder, far more than can be accounted for by radiation. He is surprised at the result, but has brought himself by this experiment to the threshold of a discovery, none other than the law of the correlation and conservation of force.

The reason for his undertaking the experiment alluded to is instructive. He desired to heat his building with the same fuel required to drive his engine, supposing that as the heat escaping from the boiler and engine helped to warm the air of his factory, he might capture all the rest by passing the exhaust through some combination of pipes or heaters, and thus use the entire heat generated by the combustion of the fuel consumed for heating purposes, making a clear gain of the work performed.

His experiments have convinced him that this can not be done but he fails to see why. The reason is, simply, that the heat which is converted into work can only be used for heating purposes when *reconverted* into heat.

The correlation of forces, that is, their convertibility into each other, and the conservation of force, that is, its indestructibility, are two fundamental principles of physics. If the heat imparted to steam by the combustion of fuel could be wholly converted into work, the steam would be wholly condensed and leave the exhaust in the form of water, its temperature being precisely that at which it was fed to the boiler. But much of the heat escapes by radiation before any work is performed by the steam. This heat still exists as heat, and may be used to warm a building or for any other purpose to which it can be advantageously applied. The steam when it performs work becomes partially condensed in the effort; a portion of it is converted into mass motion or work, and only a residue escapes in the exhaust steam. So far as the mass motion is employed in overcoming friction, it becomes reconverted into heat, but when employed to the raising of weights or to the overcoming of any resistance other than friction, it is not reconverted into heat but into other forces.

If the coal used in the furnace of the engine be such an amount that it would exactly heat the building in which the engine is placed, and the radiated heat and that contained in the exhaust steam be applied directly to heating the building, it will be found that an additional expenditure of coal proportional to the amount of the work performed by the engine, will be needed to secure the proper warmth, not taking into account the escape of heat through the smokepipe or chimney which is always a source of loss.

THE EFFECTS OF NIGHT SOIL ON VEGETATION.

Our attention has been several times called to an article on this subject, which, it is said, has been copied extensively in the country papers and credited to the SCIENTIFIC AMERICAN, deprecating the use of night soil as a fertilizer. We have no recollection that such an article ever appeared in our columns, and do not know upon what grounds the objections were made; and we deem it probable that a mistake has been made in referring the article to this journal, unless, indeed it was one of the numerous communications addressed to us, expressing views for which we do not hold ourselves responsible. The article referred to is said to have been published a long time since, and, after search, we are unable to find anything expressing the views which are attributed to us.

We will say, however, now, as the question has an important bearing upon the earth-closet system, at present attracting much attention, that, in our opinion, a compost made of earth and night soil in the proper proportions, would prove a most valuable and concentrated fertilizer.

This opinion is based, not only upon chemical considerations but upon experience and observation. We have used it on land devoted to flower and vegetable culture with the very best results.

We have seen rose bushes, which have become old and unproductive, stimulated into the most luxuriant bloom by putting crude night soil, dipped from privy vaults, into a trench dug around them, at a little distance from their roots. The experiment has been repeated with peonies with the same results.

All manures, however, used in this way, are apt to prove too heating, especially in a dry season. It is much better that fermentation should take place before these are applied to soils, where delicate plants are to be reared, unless they are used for forcing, when the additional heat is beneficial. We, for this reason, advocate for gardening purposes, the keeping of any compost, until it has well rotted before applying it to a garden; but for grain or grass crops, plowed under in the spring, there could be no objection to its immediate use, and much of the ammonia which would be lost in the process of rotting would be thus saved.

It will thus be seen, that instead of condemning the use of night soil as a fertilizer, we regard it with the highest favor, and we have based our disapproval of the water-closet system principally on the fact that it is a constant and enormous tax upon the country, through the great waste of this valuable fertilizer, depositing it in the beds of rivers to infect their waters, instead of restoring it to the land from which its constituents have been derived.

THE STREET CROSSING QUESTION.

In New York and in other large cities where the streets are crowded with vehicles, the crossing of streets by foot passengers is attended with danger and inconvenience. "Good clothes" stand no chance in muddy weather, or more properly speaking, they stand an excellent chance of being spoiled by bespatterings of filth.

But it is one thing to point out a disease and quite another thing to prescribe a remedy. In this case it must be a specific—applicable to every case and a sure cure.

We have tried the elevated bridge in New York and have given it up for the best of reasons. It would not answer. Some have suggested the tunnel as a substitute, but this appears to us to be only inverting the evil. In the first case, it is climb up and then down, in the latter, it is first down, and then up. People with sound legs prefer to take the risk on the surface, and to encounter the fire of mud pellets rather than to execute the climbing, while those with weak legs find themselves unequal to two long flights every time they wish to cross a street, preferring to be taken in charge by some friendly M. P., and piloted to the opposite shore.

What is to be done? Can anybody make a practical suggestion? Don't all speak at once, or quote from Hamlet's soliloquy

> —"Rather bear those ills we have
> Than fly to others that we know not of."

Is this problem so intricate that its solution is not possible? Is there not among all the list of mechanical contrivances—turn-tables, flying machines, wire tramways, cranes, swings, and what not—something that will take a human body up and set it down safely across a mud river? Make answer, inventive genius. Is a street crossing harder to be accomplished than an ocean cable, or a railroad to the top of Mount Washington?

For ourselves, we are better at recording and writing up others' inventions than making them ourselves, and therefore we are in no hurry to try our hand at inventing a new street crossing; but we shall rejoice if some of our readers can immortalize themselves by giving to the world this long sought for and prayed for desideratum.

We see by the last number of the London *Builder* that steel bridges for the crossings in that city are talked of. We hope they may like them when they get them, but whether made of steel or iron, stone or wood, New York has had enough of the bridges.

The bridges proposed are to span the streets eighteen feet above the carriage way, which at the lowest computation, would make 48 steps up and down, a most agreeable thing to contemplate for weak knees in hot weather, or when the steps are covered with ice. Some have suggested that if these bridges were built the people would not use them. We have had it demonstrated that they would not, and if the Londoners are wise, they will take a leaf from our experience and drop all further consideration of bridge crossings.

Nevertheless, bridges may not cost quite so much in London as did our Fulton street bridge, and the proposed experiment may be less expensive than ours was.

INCIDENTAL OBSERVATIONS.

What inventor, mathematician, or chemist, has not, while pursuing the solution of an intricate problem, been struck with the vast number of facts strewed all along his path like pebbles upon a seashore. Many of them are new and striking, but in the ardor of the main investigation are too often lost sight of and forgotten. They are gateways to diverging avenues, leading off into new and unexplored regions of thought and knowledge.

Would it not be wise to put up some landmarks by which they can be readily referred to when the mind finds itself at liberty to recur to them—some memoranda, in brief, of the facts themselves, and the train of thought suggested by them on first sight?

We would by no means advocate a discursive habit of thought. The only way to succeed in a mental struggle with an intricate problem is to pursue it singly and unremittingly. But there is no reason why we should, in a search for pearls, reject what may prove a diamond, when we have time to scan it.

With inventors we are sure the habit of recording incidental observations and suggestions made in the working out of their devices, would prove of the utmost value. Many a man working for a thing which he was never able to accomplish, has found what has proved more valuable, than what he directly sought ever could have been. But the majority of such incidental discoveries are never thought of a second time; or, if thought of, remembered only in a dim, cloudy manner too indefinite to avail in their recovery.

It has been said of one of the most successful authors, that he was in the habit of carrying in his pocket a memorandum book, wherein he recorded any idea or peculiar form of expression that struck him as weighty or admirable, on the instant it occurred to him, and that he would even rise from his bed in the night to do this rather than to trust his memory to reproduce it on the ensuing morning. The same has been asserted of some musical composers of note, and we know it to be the case with some literary men of the present time, with whom we are acquainted.

We advise, not without having tested its worth, a similar course for inventors and mechanics. Let any one try it for one year, and then carefully examine their notes thus collected, and they will be surprised to find what a mass of interesting and, in many cases, practically useful information a book of fifty or sixty pages, six inches long by three wide, can be made to hold. Sifting out the chaff there will always remain some good seed, which, sown on good ground, will bring forth fruit—some an hundred fold, some sixty fold, some thirty fold.

Every mechanic, particularly he who wishes to become a successful inventor, ought to be a student, not only of recorded facts in books, but of facts as they are brought to his notice daily in his practice. But he may not, on the instant a fact presents itself, always stop his work and go into a brown study over it. He may, however, as he leaves his work at

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noon or at night, put down the data for future study and thought, and, if of an inquiring mind, he will find the highest pleasure and profit in such study. We have little confidence in the ultimate success of those mechanics who are willing to grope blindly along, content to acquire merely that modicum of knowldege which will gain for them a full day's wages. Such men will of necessity remain hewers of wood and drawers of water, while for the more intelligent and better-informed workman, there is always an avenue for advance in position and earnings.

The following fact will illustrate and enforce the importance of such a course as we advise, better than a column of argument.

From time immemorial the Government of Great Britain has caused a red worsted thread to be always woven into the cordage manufactured at their roperies. The object of this thread is to prevent pilfering, and to facilitate the recovery of stolen property. One fine morning it struck a poor man in Chatham Yard that a jute thread would do just as well as one of worsted. The experiment was tried. The rope with the jute thread in it was tested in a variety of ways—by being exposed to salt water and the weather for a sufficiently long period—and the result was that worsted was abandoned. Such is the magnitude of government transactions that, by simply substituting that little thread of jute for one of worsted, that country saves £1,800 a year forever,or at least as long as ships want rope. Mr. Baxter nearly doubled the pay of the mechanic to whom the credit of this discovery is due.

OCEAN TELEGRAPHY.

The successful laying of the French Atlantic Cable has banished the last doubt as to the practicability of successfully laying and working cables of any desired length. The first attempt at laying a cable across the bed of the Atlantic failed. This failure has been followed by two remarkable successes,and ocean cables are henceforth to be the means by which a large proportion of all the communication will pass to and fro between the hemispheres. So long as only one cable had been laid and worked, there remained the doubt that this success was exceptional, that it might be followed by a series of failures, which would demonstrate a great risk in investing money in such enterprises. But the recovery and putting in order the first cable, for a time almost believed to be a total failure, and the now perfect and profitable working of these cables betweenEurope and America, have doubtless convinced capitalists of the safety of this class of investments, and the raising of funds for further enterprises of this kind will be an easy matter.

It must be apparent to every thinking man that the present cables cannot afford facilities equal to the growing demand. A cable from San Francisco to China is inevitable, and more Atlantic cables must be provided.

With these facts in view we are not surprised to learn that many new projects are talked of. Among these is a cable from Scotland to Quebec by way of the Faroe Islands, and a West India and Panama cable, which is designed to unite South America with Europe by the way of Cuba and the United States and the cables already laid down.

The rapid and astonishing increase of telegraphic communication throughout the world, has only a parallel in railroad extension.

LOCATION OF HEAVEN.

Theological writers have always been puzzled to fix upon any very definite idea in regard to the geographical—so to speak—location of heaven. The Christian faith associates it as a final resting place for redeemed souls, and preachers have drawn from it the lesson that Revelation, for wise reasons, had veiled the subject in obscurity. But science is progressive. It digs deep into the bowels of the earth, and soars away into regions of infinite space, so that at last we have a philosopher sufficiently bold who undertakes to remove our perplexity and solve all our doubts upon this sublime subject.

Instead of being a matter of philosophic and Christian speculation we are now provided with a scientific solution of the whole difficulty by D. Mortimer, M. D.—not D. D. According to his theory "there is a vast globe or world far *within* from the surrounding photosphere of ethereal fire, which all denominate the sun, which globe is estimated to be at least five hundred thousand miles in diameter." Dr. Mortimer states that he has brought divine revelation to bear on this vast central globe, and is plainly convinced "that the globe thus discerned is the Heavenly Empire wherein the righteous from this earth find their future home." Not content to have made the discovery of the exact locality of "our heaven," the doctor has gone into a mathematical calculation of the number of minutes it requires for the spirit's flight from earth to this celestial abode, for all of which information doubting and believing souls will forever thank the learned doctor.

CALCULATIONS ABOUT HUMAN LIFE.

By tables of mortality are understood, carefully-computed lists, indicating how many survivors remain annually, during a series of years, out of a given number of births at the start.

Many such tables have been computed during these latter years by various authorities and in different countries. They are highly interesting in a philosophical point of view, and indispensable for the calculation of the rates of interest to be paid by life insurance companies, the importance of whose operations is becoming daily better understood and appreciated by the intelligent public.

The first tables of mortality were drawn up by Halley in the year 1693, and were based on the registers of the city of Breslau, in Silesia.

In 1746, De Parcieux published his "Law of Mortality in France for Chosen Heads." These chosen heads comprised only monks and nuns who had taken the oath of celibacy.

In 1806, Duvillard computed another for France, from facts collected before the Revolution.

The first table in which a distinction is made between the sexes was, if we are not mistaken, established by Demonferrand in 1838 in the *Journal de l'Ecole Polytechnique.*

In England the first tables used were those calculated by Galloway and by Finlaison. In Germany, Baumann, Casper, and Hülsse were the pioneers in this branch of statistical science, and in Holland it was Kersseboom. In Belgium the eminent Secretary of the Academy of Sciences and Director of the Royal Observatory, Mr. Quetelet, who, during a long life of study, devoted himself specially to the investigations of the laws which regulate human mortality and of the periodicity of natural phenomena in various countries, has at different times published very complete and interesting tables on the present subject.

The rates of mortality in Belgium being very similar to what they are in this country, we reproduce them below, believing that they will prove interesting to many of our readers to whom the original documents are not available. In the first column is indicated the series of years from birth to the end of life; in the second column, how many persons out of 100,000 born, remain alive on the average at the expiration of each succeeding year; in the third column is found the probable further duration of life taken from any given period, as shown in the first column. The last column indicates that one to one may be betted on a person's chances of attaining an age obtained by the addition of his actual age to the number of years he has still the probability of living.

The duration of the life of females in town and country is nearly equal, but with men it is far different, those living in rural districts living much longer than those in the cities. After the age of 25 the life of rural men is rather longer than that of the women.

TABLE OF MORTALITY.

Age.	Survivors.	Probable life.	Age.	Survivors.	Probable life.
Born.	100,000	22·9			
1	79,448	38·4	53	30,944	....
2	71,228	43·5	54	30,333	....
3	67,121	45·9	55	29,720	16·5
4	64,564	46·9	56	29,040	....
5	62,845	47·2	57	28,339	....
6	61,587	47·2	58	27,615	....
7	60,568	47·1	59	26,896	....
8	59,702	46·8	60	26,160	13·1
9	58,944	46·4	61	25,352	....
10	58,220	45·9	62	24,471	....
11	57,684	45·3	63	23,543	....
12	57,150	44·7	64	22,601	....
13	56,616	44·0	65	21,625	10·1
14	56,082	43·4	66	20,630	....
15	55,548	42·8	67	19,624	....
16	54,948	42·2	68	18,601	....
17	54,318	41·6	69	17,578	....
18	53,657	41·1	70	16,529	7·5
19	52,965	40·6	71	15,437	....
20	52,254	40·0	72	14,325	....
21	51,528	39·5	73	13,210	....
22	50,747	39·0	74	12,091	....
23	49,948	38·4	75	10,976	5·6
24	49,150	37·9	76	9,888	....
25	48,459	37·3	77	8,822	....
26	47,820	36·6	78	7,764	....
27	47,204	35·9	79	6,851	....
28	46,596	35·3	80	5,988	4·0
29	45,990	34·6	81	5,152	....
30	45,388	33·9	82	4,363	....
31	44,796	33·2	83	3,648	....
32	44,210	32·5	84	3,005	....
33	43,602	31·8	85	2,424	2·8
34	43,003	31·1	86	1,902	....
35	42,404	30·4	87	1,473	....
36	41,811	29·7	88	1,134	....
37	41,207	29·0	89	892	....
38	40,588	28·3	90	683	2·4
39	39,958	27·6	91	518	....
40	39,317	27·0	92	391	....
41	38,655	26·3	93	276	....
42	37,980	25·6	94	193	....
43	37,295	24·9	95	131	1·9
44	36,605	24·3	96	88	....
45	35,919	23·6	97	62	....
46	35,256	22·9	98	40	....
47	34,667	22·2	99	23	....
48	34,082	21·5	100	12	1·0
49	33,498	20·8	101	6	....
50	32,877	20·1	102	2	....
51	32,235	....	103	1	....
52	31,582	....			

MARKS PRODUCED UPON THE BODY BY LIGHTNING STROKE.

We gave on page 107, current volume, an account of some extensive and interesting researches with the great induction coil of the Polytechnic Institution in London, upon the effect produced by lightning stroke on the bodies of animals, so far as these effects might be considered as indications of death. There are, however, some other characteristic effects produced upon the surface of the body by lightning stroke which are worthy of attention. Dr. Richardson, the conductor of the experiments referred to, says that several kinds of injuries to the external parts of the body have been described as following upon the reception of severe shocks from lightning electricity. Some of these have been considered by excellent authorities as chimerical,or as vulgarly-exaggerated descriptions of observed, or presumably observed, facts; they have been left up to this time in singular doubt and obscurity. He has, therefore, now that the means of research are at command, investigated this subject with care, and has been able, by a few simple experiments, to place what had been doubtful in a sound and scientific position. The following marks of injuries have been recorded:

1. Marks of burning of the skin and hair.

2. Impressions on the body of metallic substances, such as coins, ornaments, beads, crosses.

3. Ecchymoses, or vivid blue spots, sometimes accompanied with exudations of blood.

4. Impressions on the body of an arborescent kind, supposed to be impressions of trees or fences near or beneath which the person stood when struck by lightning.

5. Loss of hair.

Burns.—Burns on the body from lightning or electrical shock are more likely to happen in cases when the person is not destroyed than when the shock is fatal. The reason of this probably is that the burning shock itself is of the flaming rather than of the penetrating kind. The burnings differ in degree; they may be mere singeings of the hair, with superficial scorchings or blisterings of the skin; or they may be extensive cauterizations leading to surrounding inflammatory action. Metallic substances in the dress, such as pins, staybusks, buckles, and the like, while they may, in one sense, have their use in directing the shock from point to point over the body to the earth by a superficial route, lead often to severe local injury. In these cases the parts which are burned are those which lie between the metallic points.

Corroborative of these conclusions of Dr. Richardson, we have now before us an account of a remarkable case of burning by lightning, in the *American Journal of Medical Science.* The victim of the stroke, was struck upon the back of the head, where she had her hair done up in a knot and fastened by two hair pins. The hair was much scorched, and under the knot of hair the skin was severely burned. Thence the electric fluid passed down, burning the lower portion of the right ear, in which was a gold ear-ring; then crossed the throat and passed down to the left of the sternum. The burn thus produced was about three inches wide, covered with blisters. The fluid here left her body, and finding some other conductor, passed down, still on the left side, to just above the crest of the ilium, extending thence forward and backward to the symphysis pubis. This burn was about 12 inches long, and about the same width as the first. The next burn began on the patella of the right knee, extending to the bottom of the heel, in reaching which it wound around the inner side of the leg. The lightning passed off at the bottom of the heel, bursting open the heel-seam of a strongly sewed gaiter boot.

The lightning melted portions of the wires of her hoopskirt, also a small part of the lower end of the steel of her corset. The steel clasp of the elastic garter, the steel of her corset, and the metal of her hoop skirt, appear at several points to have carried off the electric fluid. Had the wound been continuous from head to foot, a fatal result would have been inevitable. As it was, however, the lady recovered.

Dr. Richardson confirms the popular impression, pretty generally, we believe, discredited by scientific men hitherto, that the impressions of metallic substances may be left on the bodies of persons struck by lightning. He says:

"Some years ago an eminent meteorologist of this country forwarded to one of the learned societies the particulars of a case which had been sent to him by a medical man residing in the West Indies. In this case, in which a man was subjected to lightning shock, it was said that impressions of various ornaments were most distinctly left on the body, and, from the manner in which the report was drawn up, it carried with it an air of the strictest probity. The marks, it was said, were of a dark bronze color, and the impressions were so distinct that they could not be doubted. A bracelet or chain was, I believe, stated to be impressed, a coin, and a cross, or similar ornament. On hearing this description, I drew up a short leader upon it, and forwarded the article to the editor of the *Medical Times and Gazette,* who took it at once to Professor Faraday, soliciting his opinion as to the probability of the occurrences described in the report. Faraday listened with much attention, and then observed, that although he would not like to say the phenomena were impossible, he could see no explanation of them, and, indeed, could scarcely admit the validity of the observation. On this, such was my admiration of the great physicist, I withdrew the essay. In these new researches, however, I have recurred to this subject, and have put the question experimentally in different ways, and now I am bound to say, that impressions such as have been referred to, may be faintly struck on the body. Thus, by placing a thin ring of twisted wire on the ear of a white rabbit, and on discharging through the ring from the large Leyden battery, there was unquestionably left on the ear a faint blue line showing the position of the wire, the irregularities caused by the twisting of the wire being also distinctly traceable. In the living animal the appearance quickly fades; in the dead it would of course be left until the organic changes of decomposition removed it. The nature of the mark is very simple; it is an ecchymosis taking the line of the metal, and so presenting a rough outline of the form of the metal. The shock must be received on a firm surface, such as bone."

Simple ecchymoses and livid spots, having no reference to metallic or other bodies in contact with the body, are sometimes presented on the surface of the body in a very marked degree.

Dr. Richardson affirms that marks on the bodies of persons struck by lightning of an aborescent kind—have been noticed, and have naturally, though wrongly, been supposed to be representations of the figures of trees. To the unlearned such a suspicion is easily conveyed,for the arborescence is described as very perfect, the stem, the larger branches, and smaller branches, as of a tree, being marked out with much refinement. To the learned the suspicion has seemed an absurdity, there being no known physical law by which the picture of a tree could be fixed on the body, in miniature, by lightning. The truth, when explained, is very simple. The arborescent appearance may be fully accepted as a fact, and as having been observed in cases of lightning shock; but the arborescence is not the figure of a tree; it is an anatomical outline of the trunk and branches of superficial veins of the body of the subject. More than one hundred and ten years ago, the fact that the veins could thus be penciled out by lightning discharge, was fully described by the illustrious Beccaria, who states minutely that a man struck dead by lightning in a storm was left generally rigid, and exhibited this added and curious phenomenon. The lightning, choosing the best con-

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ductor, having struck a vein in the neck, and followed it out to its minutest ramifications, the figure of the vein appeared through the skin, finer than any pencil could have drawn it.

In order to test this explanation Dr. Richardson directed a charge from a Leyden battery through the ear of a white rabbit, from a large trunk of a vein at the base, and in the line of the center of the ear, to the extremity of the organ. One discharge was in this experiment quite sufficient to bring out the figures of two large veins, which appeared like pen marks on the surface. He says:

"Blood in these cases undergoes arrest of its motion, expansion, and possibly decomposition, by which some of the coloring matter is liberated. Thus, the vulgar observation of arborescent marks on the dead after lightning-shock admits of recognition by the most critical, and of explanation by the most simple of scholars. It is often thus that the illiterate, correct in what they have seen in nature, appeal in vain to science, because, impelled by the strongest of all instincts, reason, they connect their facts with some theory of cause which science proclaims to be untenable, and dismisses alike fact and theory with hasty contempt."

The loss of hair as one of the sequences of lightning stroke has also been confirmed by these experiments.

OXFORD WINS.

Harvard and Oxford have had their rowing match, and, as was clearly foreshadowed in the English press, the Harvard boys came within one of beating. The distance, four miles and a half, was made by the Oxonians in 22 minutes and 40½ seconds. The Harvards came in just six seconds behind—very much to their chagrin, no doubt, as they had traveled three thousand miles to play a game in English waters, where they had to contend against the powers of the best oarsmen in the world, and the sympathy of half a million Englishmen who naturally roared loud over the success of their favorites.

It is now freely asserted that the Harvards were over-trained, and that, on the day of the race, Simmons had the diarrhea and Loring was troubled with an angry boil.

Princes, dukes, earls, lords, costermongers, fishmongers, cordwainers, roughs, women, and children, crowded the banks of the Thames, and considerable money changed hands.

Thus ends the boat race about which so much fuss has been made, and the universal Yankee nation is finally whipped for once at least. It becomes us to gracefully acknowledge the corn.

The race was decided at about 37 minutes past 5 o'clock P. M., Greenwich time, and the result known here, owing to the difference in time, a few minutes past one o'clock. The real time occupied in the transmission was twenty-three minutes and thirteen seconds, the greater part of which was consumed in carrying the message on horseback to the nearest telegraph station.

A Luminous Toe.

A lady correspondent wrote to the Boston *Transcript*, that "upon retiring to rest, the gas being out and the room quite dark, the writer's attention was directed to her foot, which was illuminated by light, which, upon examination, was found to be phosphorescent, and proceeded from the upper side of the fourth toe of the right foot. Upon rubbing it with the hand the light increased and followed up the foot, the fumes filling the room with a disagreeable odor. This lasted some time, when the foot was immersed in a basin of water, hoping to quench the light, but to no purpose, for it continued beneath the surface of the water, the fumes rising above. The foot was taken out and wiped dry, but the light still remained. A second immersion of the foot followed, and soap applied, with the same result. No more experiments were tried, and after a time it gradually faded and disappeared. The time occupied by the phenomenon was about three quarters of an hour. The lady's husband substantiates the above facts, as he also witnessed them. Will some one please explain the above, as the emitting of phosphorus from a live body is new to the writer?"

The whole circumstances of the case go to show the presence of phosphorus. We have noticed a like phenomenon, but there is not the slightest necessity for supposing that it was "emitted from the live body."

Galvanic Chain.

"The galvanic chain," says *The Druggist*, "is really an instrument of most ingenious and beautiful construction, and is one of the handiest and most effective which the medical practitioner can employ. It is in the form of a flat flexible chain, and comprises 120 separate pairs of galvanic elements. These consist each of a small zinc tube for the electro-positive portion, surrounded with copper rings, which form the electro-negative. The copper of one pair of elements is hooked into the inner side of the zinc tube preceding, while it is isolated from the zinc of its own pair by a simple but most ingenious set of stitches of thread. This petty flexible battery of 120 pairs is excited by simply dipping it into vinegar, and the links are near enough to retain sufficient fluid by capillary attraction to keep up the action for some time. There is thus constituted a battery yielding a very small quantity of galvanism owing to the small size of the individual elements, but high intensity owing to their number. It easily decomposes water, and of course saline solutions, and may be used to demonstrate the process of electrolysis. For medical purposes it yields a direct current, which is the desideratum for neuralgic affections, very decidedly but not violently. By attaching a little vibrating spring in the course of the conductor it gives a succession of interrupted shocks, such as are useful for muscular and paralytic affections. Most of the cheap and handy electro-magnetic machines, as is well known, give only the interrupted, but not the continuous. The chain is an instrument of power and precision and convenience, and as such we recommend it to our medical brethren for the cases in which galvanism is known to be of use. There is another apparatus, called a belt, also flexible, and containing about forty elements of zinc and copper wire ingeniously interlaced and isolated."

Editorial Summary.

As a general rule, according to experiments by M. Schultz, it has been found that the point of solidification of fluids is lowered by substances dissolved therein, and that gases dissolved in fluids exercise the same effects. Pure acetic acid fuses at 16°; this is lowered to 15·2° when a current of carbonic acid is transmitted through this acid. It is well known that hydrochloric acid gas and ammonia gas lower the freezing temperature of water in which they are dissolved; so do carbonic acid and sulphurous acid gas; and it has been ascertained by M. Schultz that nitrogen, oxygen, and hydrogen gases exert the same effect when dissolved in water. Numerous experiments were made by him with the view of ascertaining the effect of an increase of pressure brought to bear upon the absorption of various gases by water, and the lowering of the freezing point of that liquid in consequence thereof. By the phenomenon of regelation is understood that property exhibited by ice of freezing together to a solid mass, when pieces of that substance are pressed together at the temperatare of 0°. After quoting the opinions of Messrs. Faraday, Forbes, Thomson, and Helmholtz on this subject, the author says: "When we take it for granted that regelation is the formation of ice from water anew, we must bear in mind that only pure water, or water, at least, not saturated with air, is suitable for this purpose."

THE English papers state that 20,087,809 passengers availed themselves of the London Underground Railroad for the half year ending July 30, and that a complete extension of this means of communication is soon to be commenced. Day by day the necessity for similar facilities of travel in this city is becoming more and more apparent; and the difficulties of constructing an underground railroad will only be increased by delay. Workers in this great center of industry are only too sensible of the advantages which would be afforded by an unimpeded and expeditious system of conveyance. There is no lack of capital to begin and complete such an undertaking, and the inventive genius of the country can place in the hands of those willing to engage in the work, means and appliances which will render an under ground way here incomparably safer and more healthful than that now established in London. Besides the certainty of receiving handsome returns for the money invested, the promoters of this enterprise will enjoy the satisfaction of having done much to further the public welfare.

THE Melbourne papers give some particulars relative to a meat-preserving process, the merits of which, it would appear, had been satisfactorily tested. The meat having been cured was taken on a voyage to England and back in the ship *Mary Thompson*. The meat was in a cask, and had been preserved in fat. The Captain of the vessel exposed the meat to very severe trials on the way home, placing the cask on deck for days together under a tropical sun, and at other times leaving it for lengthened periods in the neighborhood of the cook's galley. When the cask was opened, the meat proved to be in a perfectly sound condition, and was capital eating. The advantage of the process over others is that the meat is preserved in large joints, from which, however, all bone is extracted before they are placed in the cask. A little bisulphate of lime is used in the operation of curing, but its taste was not in the slightest degree perceptible.

THE Brooklyn *Union* says that in connection with the erection of the East River bridge, the Brooklyn terminus of which is to be the site of St. Ann's Episcopal Church, corner of Washington and Sands streets, a plan has been discussed for widening Washington street on the westerly side, making it one hundred feet in width, with twenty feet promenade sidewalks on each side of the carriage-way extending from the bridge terminus to the City Hall square. It is understood that the Government has arranged for the purchase of of the church property situated at the corner of Washington and Johnson streets, and that at the next meeting of Congress an appropriation will be made of money to erect on it a post office and United States Court building.

THE workingmen of England are determined that the productions of their brains are not to be at the mercy of unprincipled capitalists. One indication is given by the following. A deputation lately waited upon John Bright, at the office of the Board of Trade, for the purpose of asking him to bring in a bill early next session to protect the inventions that might be exhibited at the Workingmen's International Exhibition to be held next year. Mr. Bright expressed his entire sympathy with the object of the deputation, and promised to comply with their request.

A COMMITTEE appointed by the French Academy of Sciences have under consideration a communication by M. Berthault. This gentleman suggests various means of utilizing the excess of force produced in working a locomotive. He shows that it might be used in causing a stronger adhesion of the wheels to the rails, so as to prevent the train from running off, and that it might likewise be applied to the illumination of the carriages by electricity, and even to setting the telegraph in motion.

PROTECTION OF WOOD FROM FIRE.—We learn from the *Deutsche Industrie Zeitung* of July 1, that at one of the collieries at Ibbenbüren, Westphalia, the woodwork is protected from fire by being painted with a mixture consisting of 5 parts of alum, 7 parts of rye-meal paste, and 30 parts of previously washed, *i. e.*, finely divided, clay (this mixture is used for woodwork not exposed to open air); for woodwork, so exposed, a mixture is used consisting of 2½ parts of crystallized sal ammoniac, 1 part of white vitriol (commercial sulphate of zinc), 2 parts of joiners' glue, 20 parts of zinc white, and 30 parts of water. These mixtures have been found to prevent wood bursting into flame on ignition, and to greatly delay its destruction even when severe fires are raging.

AN OLD SWINDLE REVIVED.—Dailey & Co., No. 208 Broadway, N. Y., recently advertised in our paper for agents to sell a certain article. The notice was handed to us by a respectable advertising agent, and we had no suspicion that it was intended to perpetrate a swindle, but it appears to be a renewal of the old counterfeit money dodge. A perusal of this circular itself will at once show its true character, and no honest person can be deceived by it. Nevertheless we consider it our duty to expose the villains. We placed the circular in the hands of the authorities some days ago.

ANOTHER cable is coming soon, a concession having been granted by Count Bismarck to a company for the laying of a submarine cable between Northern Germany and the United States, the landing of that cable at a suitable point of the North German coast on the North Sea; and the construction of all appliances required for working the cable, which is to be constructed in the best known manner, and its manufacture is to be commenced within six months after the date of the concession, and the whole line to be completed within two years after that date.

THE freight opposition among the railroad companies which gave the public the temporary advantage of transporting goods to the West at low rates, as noticed in last week's issue, shows symptoms of abating, and a return to the old tariff may soon be expected. Erie and the New York Central have raised their prices to 38 cents per hundred pounds to Chicago. Since August 2, when the low rates commenced, the depots have been filled with Western-bound freight.

THE surveys for the East River Bridge are now finished, and the line of the bridge and approaches located. The timber for the founding of the piers is now lying at Red Hook, ready to be bolted together, previous to being sunk into position. It is thought by some that it will take three years before the work is so far advanced as to enable the cables to be stretched across the river, and that six years will elapse before the bridge can be thrown open to the public.

A METHOD of protecting iron vessels against rust and corrosion has been proposed by MM. Dance and Bertin. They contemplate the conversion of the hull of the iron vessel into a galvanic battery, by placing, inside the hull, pipes and tanks made of zinc and filled with sea water, and connected by means of bolts and rivets in metallic contact with the outer side of the vessel. They also design to use strips of zinc on the iron plates of the vessel immersed in the water.

THE London *Daily News* in an article on the new patent law of Canada says that the whole principle and practice of that law may be concisely summed up in the word "spoliation." A pretty plain hint is also given to the Canadians that a persistence in such a policy, which is shown also in all their outside relations, is more than likely one of these days to result in their being thrown entirely on their own resources.

THE leather and hide trade of Nashville has greatly increased since the war. The Nashville butchers take off about ten thousand hides a year, and nearly that number of Texas and Mexican hides arrives there during the same period. There were three hundred and seventy tanners in Tennessee before the war, and more than five times as much leather was made then as now.

ON the railroads in France electricity is taking the place of human watchfulness. On many lines there are contrivances where the passing of a train is automatically announced to neighboring stations. The cars pass over connecting wires, and the train records itself before and behind, so that its progress and appearance are alike indicated.

KEY RINGS.—We have received from C. A. Wentworth, Boston, Mass., specimens of some neat rings for holding bunches of keys, made after his patent. After the keys are put on, the ring springs to its place and is secured by a slotted button, the whole forming a very useful device for the purpose.

THE Chinese laborers are making advances into the country. A dispatch says that five hundred will shortly be sent to St. Joseph, Missouri, whence they will be distributed to various points, and that agencies are to be established there, and at St. Louis and Springfield in the same State.

AN exchange says it has been discovered that the common hardhack, *Spiræa tomentosa*, that grows plentifully in nearly every pasture, can be used in tanning leather as a substitute for sumac. A company has been formed in Boston which has advertised for one hundred tuns of hardhack.

A NEW steam roller, weighing fifteen tuns, recently ordered from England for Prospect Park, Brooklyn, has arrived. It is to be put into operation at an early day.

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INJUNCTION IN PATENT CASES.

Though right to an injunction and profits be clear, it appears, from the following decision, that a provisional injunction will not be allowed to the prejudice of an established business if the patentee has delayed enforcing his right an unreasonable time.

George H. Corliss vs. *The Dry Dock Rolling Mill, Ingham Coryell, and John Thompson.*—NELSON, C. J.—This is a motion for an injunction to restrain the defendants from infringing the patented invention of the complainant for a certain "new and useful improvement in cut-off and working valves of steam engines." The patent is dated March 10, 1849. The suit is founded on a reissue dated July 12, 1859, and which was extended by the Commissioner of Patents for seven years from the 10th of March, 1863. This patent has heretofore been under our consideration in the case of Corliss *vs.* The Wheeler & Wilson Manufacturing Company, in the district of Connecticut, September, 1861. In that case the main defense rested upon a patent granted to Noble T. Green, the 13th of March, 1855. A decree was rendered in favor of the complainant. The defense in the present case rests mainly upon a patent granted to William Wright, dated November 20, 1866.

The present suit was commenced in June, 1868. The patent on which it is founded expires on the 10th of March, 1870, within about a year and nine months after the commencement of the suit, and some seven months hence. There is no suggestion or evidence before us that the defendants are irresponsible or unable to pay any amount of profits that may be ultimately recovered against them, on the final hearing of the case, upon the pleadings and proofs; and, in the absence of such evidence, however satisfied we may be as to the right of the complainant to such profits and to an injunction against infringement, if the application had been made at an earlier period of the term of the patent, we think it would be unreasonable, and not agreeable to the course of proceeding in equity in the case presented, to interfere and break up the establishment and business of the defendants. On the above grounds we must deny the motion.

Motion for injunction denied.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

There is a great probability that a new telegraph cable will be laid between America and Ireland. This will be the sixth cable that is to connect the old world with the new, counting the three that are already laid down.

On the 25th of August, 164 cars laden with peaches, arrived in Jersey city, containing 82,000 baskets, the largest quantity ever brought in on one day.

It is announced that ninety miles have been graded of the trans-isthmian railway on the Spanish Honduras route from Puerto Cabello, on the Gulf of Honduras, to Amcepola, on the bay of Fonseca, on the Pacific side. The rails for the road are arriving every week, at Puerto Cabello, which has been declared a free port. In crossing from the Gulf of Mexico to the Pacific Ocean, the railroad, it is stated, overcomes an elevation of three thousand feet. When the road is completed, it is computed that the passage to California will be shortened by a week's time.

There are now engaged in the Mississippi trade nine hundred and ten steamers with a capacity of 292,174 tuns, and of an estimated value of $34,556,000. More steamboats are enrolled at St. Paul than at any other port on the river proper, except St. Louis, New Orleans, and Memphis.

The value of the boots and shoes manufactured in Massachusetts this year is expected to exceed $95,000,000. The wholesale dealers in Boston are forming a Shoe and Leather Dealers' Exchange. Since January 1, nearly 800,000 cases of goods have been shipped from that city, an excess of fully thirty-three per cent over the corresponding period last year.

The Denver, Colorado, *News* reports some rich silver discoveries made near Blue river, above Breckinridge. Assays made at the mint run from $150 to $200 per tun of ore.

The old stone house in Guilford, Connecticut, the oldest one on the continent, built in 1640 for a fort, where all the inhabitants of the town gathered every night, to be secure from the Indians, is undergoing extensive repairs, the original model, however, being carefully retained.

At Stockholm, Sweden, when a sewer was dug recently, the hull of a vessel was found eleven feet under ground, which is thought to have been there about three hundred years.

The great "mass" of property recently found in one of the Superior mines has the following dimensions: length, 65 feet; hight, 32 feet; thickness, about 2 feet; giving a total of 4,160 cubic feet. The purity of the mass is estimated at 65 per cent. This would give a total of 832 tuns, making it by far the largest mass of copper ever found on Lake Superior or in the world.

Befrigerator cars are to be used in transporting California fruit to the East, to return loaded with butter, oysters, and other articles which the Californians need.

A raft of lumber lately passed by Winona down the Mississippi river, which measured over three acres in surface, and contained 2,200,000 feet of lumber.

The Maine Central and European and North American Railway Companies have agreed to carry and return stock and other articles for the New England Fair free of expense, and passengers at half price.

The Portsmouth Navy yard has lately received an accession to the working force of sixty carpenters and several joiners, making the number of employés about 1,500. Business has become somewhat more animated there.

The manufacturers of Fall River, Mass., have decided to run the mills but three days in the week for the present, the price for goods produced not covering the cost of production.

A submarine telegraph from Rangoon, by way of Singapore to the island of Java, and thence to China, is projected.

Twenty-six million gallons of water were pumped into the new reservoir at East New York on the 26th of August. A new pumping engine is nearly completed. The supply of water is ample for all purposes.

NEW PUBLICATIONS.

A NEW EXPOSITION OF THE LEADING FACTS OF GEOLOGY. Including a Disquisition upon the Origin and Formation of Petroleum and Coal. By Gideon Frost. New York: The Trow & Smith Book Manufacturing Company, 48 and 50 Greene street.

Under this heading has recently been published a small work professing to controvert many of the geological theories which have received the assent of the most noted geologists of this country and of Europe. It moreover theorizes upon subjects respecting which celebrated geologists have either not essayed a theory, or respecting which there is no general agreement among them. We cannot coincide with the conclusions of the author, although we have been interested in his views.

SUBMARINE BLASTING IN BOSTON HARBOR, MASS. Removal of Tower and Corwin Rocks. By John G. Foster, Lieutenant-Colonel of Engineers, and Brevet Major-General U. S. A. With Illustrations. New York: D. Van Nostrand, 23 Murray street, and 27 Warren street.

This is an interesting and instructive account of an important engineering work, successfully accomplished during the years 1867 and 1868, notwithstanding many difficulties were met with in its progress. Full details are given of all the apparatus and methods employed in the operation, and the work cannot fail to prove valuable to all interested in submarine engineering work.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,735.—FABRICS FOR TRIMMINGS.—Geo. E. King New York city. June 4, 1869.

2,213.—TOOL FOR HOLDING AND DRIVING BRADS.—M. D. Converse, London, Ohio. July 21, 1869.

2,273.—CARRIAGE AXLE.—M. J. Frisbie, New York city. July 27, 1869.

2,285.—APPARATUS FOR FACILITATING THE GRINDING OF THE KNIVES OF HARVESTING MACHINES.—Charles Coventry and Wm. Boynton, Auburn, N. Y. July 28, 1869.

2,292.—APPLICATION OF SPRINGS TO SEATS AND BEDS.—E. H. Robinson, Providence, R. I. July 29, 1869.

2,346.—LIQUID AND GAS METER.—W. Hamilton, Toronto, Canada, and H. Kimball, Randolph, Vt. August 5, 1869.

2,368.—MACHINERY FOR COMBING FIBROUS MATERIALS.—H. Conant, North Providence, R. I. August 7, 1869.

2,399.—METALLIC CARTRIDGE.—E. Martin, Springfield, Ill. August, 10, 1869.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

S. M. P., of Minn.—Callan's compound cast-iron battery, about which you ask, is fully described in the *Philosophical Magazine*, Vol. XXVIII, page 49. As you may not be able to get access to that work, we will say that it consisted of 300 cast-iron cells, each containing a porous cell and a zinc plate four inches square, 110 cast-iron cells with porous cylinders and zinc plates 6 inches by 4 inches, and 177 cast-iron cells, each containing a porous cell and zinc plate 6 inches square. There were, therefore, 577 elements containing 96 square feet of zinc and 200 square feet of cast iron. The porous cells contained dilute nitro-sulphuric acid, and the cast-iron cells contained *strong* nitro-sulphuric acid. It was, of course, a powerful battery. Animals were instantly killed by its discharge.

J. W. S., of Mass.—The ups and downs in a water pipe running from a distant spring to a pump, unless one or more of them exceed the hight to which water can be raised by an atmospheric pump in the locality named, will not affect the working of the pump except to add to the friction of the water column, thus absorbing power. The nearer you can place the pump down to the level of the spring the less power will be required to work it. You are right in supposing you will get the effect of a siphon in the case you mention.

J. G. M., of Ala.—The shaft for driving your looms should make as nearly as may be, the same number of revolutions per minute as the loom makes picks. In other words, the pulleys on the line shaft and the loom pulleys should be of the same diameter. It is considered better practice to speed up as near to the prime mover as possible than contrawise, as that allows lighter shafting and so reduces not only first cost but subsequent friction.

A. B., of N. J.—The cement of which you inquire is made by dissolving enough gutta-percha in a mixture of ten parts of bisulphide of carbon and one of oil of turpentine to form a thick compound. It is a strong cement and holds leather very firmly provided all oil is removed from the surfaces to be united. The pieces, after they are put together with this cement, should be held firmly together until perfectly dry.

P. R., of Ohio.—The chemical composition of urea is expressed by the formula $C_2 H_4 O_2 N_2$, that is 2 equivalents of carbon, 4 equivalents of hydrogen, 2 equivalents of oxygen, and 2 equivalents of nitrogen. As the equivalent of carbon is 6, that of hydrogen 1, that of oxygen 8, and of nitrogen 14, the proportional weights of each element are, of carbon 12, hydrogen 4, oxygen 16, nitrogen 28.

G. H. W., of N. H.—The authorities to which you refer give the generally accepted theory of the action of the injector. To understand the action of that ingenious device, a good understanding of elementary principles is necessary. We could hardly make it plainer to you even by an extended essay, much less in the space we can give you in this column.

H. C. C., of Ind.—There are several processes now on trial for preserving and transporting meats from South America, and other localities where they are now wasted, to places where they can be used as food. Some of these promise well. You will find numerous allusions to them in back numbers of our paper.

A. B., of Va.—You cannot successfully melt iron with the common appliances used for melting the more fusible metals and cast it, neither can you, in our opinion, spin a piece of common plate tin into the shape desired in a lathe. With some of the very best and heaviest qualities you might perhaps succeed but we think it doubtful.

D. T. T., of N. Y.—The data given for computing the diameter of the small piston to your hydraulic press and its length of stroke are insufficient. You should in addition to the diameter of the large piston, and the resistance it must overcome at each stroke through a distance of one half an inch, also give the power applied to the smaller piston.

D. P. R., of Pa.—There are very few structures which possess greater strength in proportion to weight than paper tubes laid up with good glue. An exterior coat of shellac will protect them from the action of moisture. The interior may be protected by stopping the ends with good corks and coating the ends of the corks with sealing wax.

R. H. D., of Tenn.—You can extract the moisture from the air under a glass receiver, by placing therein a small open vessel containing strong sulphuric acid; or you may dry air, by passing it over lumps of quicklime. The choice of the methods must depend upon the circumstances of the case, which you do not give us.

R. S., of Mass.—Your method for binding schoolbooks is undoubtedly new, and from the somewhat vague idea we get from your description of it, we think it would succeed. A method sufficiently cheap and more substantial than the present is imperatively demanded.

R. G., of N. Y.—Good glue is the best material to fix emery to cloth or leather. It should be used freely and allowed to get very dry and hard previous to using. Emery belts ought not to be run on too small pulleys, as they crack the glue much more than large ones.

F. C. B., of N. Y.—We have not met with either the alloy or the liquid you mention. We are therefore unable to give you the information you seek.

J. S., of Pa.—We have read your communication with interest and agree with you on many points, yet we do not think it best to give place to communications on such subjects.

R. C., of Me.—The specimen of peroxide of manganese sent is in our opinion too impure for use in glass mannfacture. It contains iron in considerable quantity.

W. J. B., of Ohio.—Case-hardened iron expands more by the action of heat than steel, and less than iron not case-hardened, by a very slight quantity.

J. S. P., of S. C.—To make a good whitewash for inside work, use only lime and water with a little good white glue or isinglass.

S. K. Van D., of Iowa.—Mottled iron is a mixture of white and gray irons. It takes its name from its spotted appearance.

E. E., of N. C.—The periodicity of the occurrence of the great meteoric showers was determined not by calculation but by observation.

W. C., of N. Y.—If you will daub some gas tar about the holes of rats they will vacate the premises.

J. F., of Ky.—The flow of rivers is more rapid in high water than in low water.

D. G., of Ill.—The term "Macadam," applied to roads, is the name of the inventor of the road. It was invented about 1783, and subsequently elaborated in practice in the roads of Bristol in England where it was first used.

S. N., of Ohio.—You can obtain brass rods already formed for small pinions of six teeth at dealers' in such articles. All you will have to do will be to turn down the bearings.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Send for Agents' Circular—Hinkley Knitting Machine Co., 176 Broadway.

Every wheelwright and blacksmith should have one of Dinsmore's tire shrinkers. Price $40. R. H. Allen & Co., P.O. Box 376, New York.

Automatic Lathes, for spools and tassel molds, made by H. H. Frary, Jonesville, Vt.

Great invention for farmers ready to patent. I will assign the whole, or a part on fair terms. Address E. Myers, Creagerstown, Md.

Air Treatment for Fermentation, Germination, Purifying, and Preserving. Rights for sale. Apply to R. d'Heureuse, P. O. Box 6844, N.Y.

507 Mechanical Movements, including many never before published. By mail, $1 12. Address Theo. Tusch, No. 37 Park Row.

If you want the real oak-tanned leather-belting, C. W. Arny manufactures it. See advertisement.

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Ct.

Wanted—A Partner with capital to bring out a valuable Patent. E. Myers, Creagerstown, Md.

S. S. Pollard's celebrated Mill Picks, 137 Raymond st., Brooklyn.

Galvanizing.—Wanted—A man to take charge of a shop who perfectly understands galvanizing cast iron. Address, with terms and references, Wm. Resor & Co., Cincinnati, Ohio.

Chas. P. Williams, No. 327 Walnut st., Philadelphia, Analytical and Consulting Chemist, and Metallurgist.

Inventors and Manufactureres of small patent articles will consult their interests by addressing R. Tilden, 63 Cornhill, Boston, Mass.

If you have a Patent to sell, or desire any article manufactured or introduced, address National Patent Exchange, Buffalo, N. Y.

E. Kelly, New Brunswick, N. J., manufactures all kinds of machinery used in working Rubber.

Materials for all Mechanics and Manufacturers, mineral substances, drugs, chemicals, acids, ores, etc., for sale by L. & J. W. Feuchtwanger, Chemists, Drug, and Mineral Importers, 55 Cedar st., New York. Postoffice Box 3616. Analyses made at short notice.

Ulster Bar Iron, all sizes, rounds, squares, flats, ovals, and half-ovals, for machinery and manufacturing purposes, in lots to suit purchasers. Egleston Brothers & Co., 166 South st., New York.

Wanted—A second-hand "Index Milling Machine." Send price, etc., etc., to W. F. Parker, Meriden, Conn.

Grindstones are kept true and sharp by using Geo. C. Howard's Patent Hacker. Send for circular 17 S. 18th st., Philadelphia.

Cochrane's low water steam port—The best safeguard against explosions and burning. Manufactured by J. C. Cochrane, Rochester, N.Y.

Send for a circular on the uses of Soluble Glass, or Silicates of Soda and Potash. Manufactured by L. & J. W. Feuchtwanger, Chemists and Drug Importers, 55 Cedar st., New York.

Mill-stone dressing diamond machine, simple, effective, durable Also, Glazier's diamonds. John Dickinson, 64 Nassau st., New York.

Leschot's Patent Diamond-pointed Steam Drills save, on the average, fifty per cent of the cost of rock drilling. Manufactured only by Severance & Holt, 16 Wall st., New York.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Machinists, boiler makers, tinners, and workers of sheet metals read advertisement of the Parker Power Presses.

Diamond carbon, formed into wedge or other shapes for pointing and edging tools or cutters for drilling and working stone, etc. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

The "Compound" Wrought-Iron Grate Bar is the best and cheapest. Send for circular. Handel, Moore & Co., 12 Pine street. Postoffice Box 5,669.

For sale by State or County the Patent Right for the best Cultivator in use. For terms address Isaiah Henton, Shelbyville, Ill.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

PREPARING PETROLEUM.—H. J. Berg, Butler, Pa.—This invention relates to a new and useful improvement in preparing petroleum for market; and it consists in separating from it the lighter and more volative substances, as benzine and naphtha, which are combined with, or held in suspension by the crude petroleum as it is taken from the wells.

CURTAIN FIXTURE.—John W. King, New York city.—This invention relates to that portion of a window curtain fixture which is called the "roller" to which the curtain is attached and from which it is suspended.

PUMP.—M. C. Hawkins, Edinboro', Pa.—This invention relates to a new and useful improvement in pumps, designed for combined forcing and lifting pumps.

HOE.—J. F. Wilson, Athens, Ga.—This invention relates to a new and useful improvement in the construction of hoes for agricultural and other purposes.

CANT HOOKS.—Peter Shults, Rockwood, N. Y.—The object of this invention is to furnish a cant hook for moving heavy bodies, as saw logs, stones, etc., which shall be adapted to more general use than cant hooks of ordinary construction.

COMBINED HAY RAKE AND SPREADER.—Henry C. Varnum, Hartford, Vt.—This invention has for its object to furnish a simple and convenient machine for raking and spreading hay, which shall be so constructed and arranged that it may be readily adjusted for either use, doing its work well and thoroughly in either capacity.

SLEIGH BELL.—George W. Lamb, Cobalt, Conn.—This invention has for its object to furnish an improved mode of attaching sleigh bells to their straps, so that they may be conveniently attached and detached, and so that they cannot turn in said strap, and that they will be held securely.

CLARIFYING CANE JUICE.—Adonis Labauve, Convent, La.—This invention has for its object to furnish an improvement in clarifying cane juice and other liquids with sulphuric acid, which shall be simple and effective and conveniently applied.

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ATTACHMENT FOR SIDE WALL REGISTERS.—J. M. W. Kitchen, Brooklyn, N. Y.—This invention has for its object to furnish an improved attachment for side wall registers, to enable people to conveniently warm their feet at such registers, and which shall be so constructed and arranged that, when not required for use, it may be closed up so as to be out of the way, and so as not to disfigure the register.

ROCK DRILLER.—Wm. F. Banks, Brookfield, Conn.—This invention has for its object to furnish an improved machine for drilling rocks, which shall be simple in construction, easily operated, and effective in operation, and which shall be so constructed and arranged that the holes may be drilled at any desired angle.

PRINTERS' GALLEY.—James Wilson, Jr., New York city.—This invention has for its object to furnish an improved printers' galley, by the use of which the time lost in making register on book forms, and the enormous wear and tear of type, under the planer and on the press, when off their feet, may be very greatly diminished, and which shall, at the same time, be simple and inexpensive in construction.

FLEXIBLE WAINSCOT.—John F. Worth, Brooklyn, N. Y.—This invention has for its object to furnish an improved board lining for walls and ceilings which may also be used for partitions in offices or other rooms, for casing steam cylinders, and for other similar uses, and which shall at the same time be simple in construction and flexible, being capable of adjustment to angles or curved surfaces.

UPHOLSTERERS' PICKER.—Harris W. Axford, Richmond, Ind.—This invention relates to a new upholsterers' picker, which is intended to pick hair or moss from old furniture, and to prepare it so that it can be used over again.

MANUFACTURE OF WOODEN TRUNKS.—Jacob Lagowitz, Newark, N. J.—This invention relates to a new manner of manufacturing wooden trunks, with a view of adapting the process to the use of machinery, so that the trunks can be quickly and cheaply made. The invention consists more particularly in the manner of treating the separate boards before they are put together to form the trunk.

BUTTER MACHINE.—D. Rogers, Mount Gilead, Ohio.—This invention relates to a new machine for agitating butter after the same has been produced in a churn. The invention consists in a novel arrangement of a conical vessel containing a revolving toothed cone with beveled teeth, whereby the butter is gradually carried from one end of the vessel to the other and thoroughly cut up and agitated during the passage.

RAILROAD CAR SPITTOON.—J. S. Du Bois, St. Louis, Mo.—This invention relates to a new spittoon, to be fitted through the floor of a railroad car, so that it will at once let all liquid matter escape, while solid articles, such as cigar stumps, tobacco, etc., will be retained in it until discharged by turning the bottom of the spittoon.

MAGNETO-ELECTRIC MACHINE.—D. F. J. Lontin and E. L. C. d'Ivernois Paris, France.—This invention, which comprises new arrangements and applications of the magneto-electric machine, consists in certain improvements upon that class of machines which have, upon the same rotating axis, several bi-branched soft-iron armatures having the form of electro-magnets, but non-magnetized, and the parts or poles of which (were these armatures magnetized) are placed on the same circumference, the curve of which they assume; second, in uniting several electro-magnets (magnetized one first time from any source), fitted outside the circumference described by the soft-iron armatures, so that their poles may be placed very close and in a concentrical circumference to the former one.

BOLT AND RIVET MACHINE.—David G. Morris, Catasauqua, Pa.—This invention consists in an improved arrangement of the sliding clamping die holder and its operating devices; also in an improved arrangement of the cutters, and also in an improved arrangement for varying the throw of the header slide.

UMBRELLA.—Thos. McCreary, Matteawan, N. Y.—This invention relates to improvements in the construction of frames for umbrellas, whereby it is designed to provide a more simple and durable construction than the present arrangement, and also better adapted for restoring the ribs or braces when broken.

STOVE.—M. R. Barr and W. T. Black, Erie, Pa.—This invention relates to an improved oven attachment for base-burning stoves, and has for its object to provide an attachment, under an arrangement calculated to be useful not only for baking but for cooking in other ways, as frying, stewing etc., and so that the heat shall pass directly under and around the exterior of the oven or not, as required.

AUTOMATIC FIRE LIGHTER AND ALARM.—John Rigby, Fort Howard, Wis.—This invention consists in an arrangement of a rotary disk to be operated by a spring, and held in check by a catch, to be disconnected by a weight, let fall by the action of the hour hand of a clock, for allowing the spring to operate the disk when required, which rotary disk carries a piece of sand, paper to scrape a match, the end of which is held against the scraper. This match is so arranged as to light a wick saturated with oil, and arranged to give a sufficient flame, and to burn long enough to waken persons sleeping in the room.

BUGGY TOPS.—J. S. Wayne, Quincy, Ill.—The object of this invention is to provide an elastic support for the bows of buggy tops when turned down, to prevent the wear and danger of breaking to which they are now exposed, when they rest on the rear prop, and over which they project about two thirds of their length; also, to prevent the wrinkling of the leather portion of the top between the two rear bows.

CATCHES FOR TABLE LEGS.—John M. Lemon, Polk City, Iowa.—The object of this invention is to provide simple and efficient floor catches for table legs, to hold tables steadily and prevent them from rolling over the floor when ironing upon them, or doing other kinds of work liable to cause them to move about, and applicable also to other articles of furniture.

ADJUSTABLE SPRING.—Wm. Evans, Eureka, Wis.—This invention relates to improvements in springs, whereby it is designed to provide a simple and cheap adjustable spring especially adapted for wagon springs, which may be readily adjusted to maintain the proper degree of springing qualities for carrying light or heavy loads.

FRICTION POWER.—John B. Bolinger, Detroit, Mich.—This invention consists in a peculiar construction and arrangement of a friction pawl grooved pulley and loose pulley, the latter being arranged on the driving shaft and having an oscillating movement imparted to it by a treadle belt and spring in the usual way.

HARROW.—Fenton Y. Tavenner, John W. Galbraith, and Alfred Smith, Sedalia, Mo.—This invention relates to improvements in harrows intended to facilitate cleaning the teeth when clogged with straw, grass, roots, etc., and to provide an arrangement whereby the teeth may be so adjusted that they may be prevented from engaging with the ground, when it is designed to move the harrow from one field to another, or along a road.

REVERSIBLE PLOW.—John W. Jones, Thomson, Ill.—The mold board in this invention is made in two parts and suspended on vertical posts, the rear one being a crank shaft, and provided at the bottom above the runner with a supporting frame for the rear part of the mold board, to which the front part is connected by two connecting rods to cause the two parts to vibrate simultaneously. The rear part is also provided with a locking device for securing the said double mold board at either side.

REMOVABLE SAW TEETH.—J. Newton, New York city.—This invention relates to improvements in the arrangement of removable saw teeth, and the means of holding them in the saw plate, calculated to provide a ready means of inserting, removing, or adjusting them, and of holding them in the required positions by the frictional action of springs, arranged to be capable of imparting the required amount of friction without danger of warping or buckling the saw plates. It also relates to an improved adjusting instrument for releasing the frictional contact of the springs to adjust the teeth.

WASHING MACHINE.—C. A. Calaway, Madison, Ohio.—The invention consists in an improved construction and arrangement of a concaved grooved bed in the bottom of a case, or tub, a pair of rollers pivoted to an oscillating frame, and a treadle device for varying the pressure of the oscillating rollers upon the bed, or the clothes thereon.

SPRING BED BOTTOM.—Joseph Moore, Tarentum, Pa.—This invention consists in supporting the longitudinal spring bars upon transverse bars, one near each end, which are suspended by spring followers inclosed in suitable cases on the said cross bars, and connected by straps to the frame of the bedstead in such a way that the followers work out and in, in connection with long elastic springs as the pressure varies.

CULTIVATOR.—Isaiah Henton, Shelbyville, Ill.—This invention has for its object to improve the construction of the improved cultivator patented by the same inventor, March 6, 1866, and numbered 52,998, so as to make it more convenient, satisfactory, and efficient in operation. Patented July 13, 1869.

WASHING MACHINE.—Jerome B. King, New York city.—This invention consists of a rotating cylinder and expansible casing for the same, within which the said cylinder works; the clothes to be washed being placed in the space between the surfaces of each, and subjected to a squeezing pressure imparted to the casing by springs, cords, and weights, or other means while rotary motion is imparted to either the cylinder or casing, and both are immersed in water contained in an exterior tub or case.

COMBINED HORSE COLLAR AND TREE.—Howard Connick, Albert Lea, Minn.—This invention consists in an arrangement of collar tree or hame in two sections, connected by hinge joints to a stock, maintaining them in the proper relations and positions, and supporting the rein ring and the loops for the attachment of the top buckling strap. It also comprises an adjustable tag connection, also an improved buckle attachment for the lower hame strap.

SEEDING MACHINE.—W. A. Van Brunt, Horicon, Wis.—The object of this invention is to improve the construction of seeding machines by the application of new devices for adjusting the teeth and their drag bars, and a novel construction of the boxes inclosing the feed cylinders.

CLOCK ESCAPEMENT.—Michael Tromly, Cincinnati, Ohio.—The object of this invention is to improve the pendulum escapement of a clock in such a manner as to diminish the rigidity and consequent friction of the working parts, and to secure greater smoothness and uniformity of action, and more ready and perfect adjustability.

MACHINE FOR MAKING SOD FENCES.—Jairus Osgood, Blue Hill, Me.—The object of this invention is to provide for public use a machine, so constructed and operating, that it will cut and raise successive sods from the ground deposit them, one on another, and press them down, so as to form a neat and compact sod fence.

HORSESHOE NAIL AND SWAGING MACHINE.—D. J. Farmer, Wheeling, W. Va.—This invention has for its object to simplify the construction and render more convenient and effective the operation of machines for making horseshoe nails, and for swaging iron into the form required for such nails and other small articles.

GARDEN IMPLEMENT.—Henry Miller, Roadside, Va.—This invention consists in adapting to one stock a variety of different instruments; to wit: a shovel, which being reversed, may be used as a plow, a four-edged hoe, a circular hoe, a reversible coulter, a roller, a rake, and a transplanter, all which may be used in succession, with very little trouble of adjustment.

GANG PLOW AND CULTIVATOR.—Freeman F. Reynolds, Bethany, Ga.—The object of this invention is to provide a simple, convenient, and effective method of adjusting the plows, so that they will run at any desired distance from the central beam, and can be readily changed and adapted to the different purposes for which they may be required.

METHOD OF POTENTIATING SUBSTANCES.—Bernhardt Fincke, Brooklyn N. Y.—This invention consists in facilitating and improving the process of potentiation, which is a process for gradually lessening and refining substances, by means of an indifferent vehicle in certain proportions, and, more particularly the process of potentiation by dilution, so as to obtain higher potencies than ever reached before, and in less time and with less labor and expense than it could be done without this invention.

VELOCIPEDE.—A. Combs, Helena, Montana Territory.—This invention relates to a new manner of propelling velocipedes, of steering the same, and of arranging an elastic support. The object of the invention is to simplify the construction of the apparatus, to facilitate its operation, and to improve its appearance.

WAGON REACH AND HOUNDS.—W. R. Santley, New London, Ohio.—This invention relates to an improvement in the construction of the reaches and hounds of wagons and carriages, and consists in making the reach and hounds of a single piece of wood.

CORK-CUTTING MACHINE.—Edmund A. Brimson, New York city.—This invention relates to new and useful improvements in machines for cutting corks.

LAMP EXTINGUISHER.—Wm. Grayson and C. D. Hyndman, Odell, Ill.—This invention relates to a new and useful improvement in the mode of extinguishing the light and fire of kerosene lamps, but applicable to lamps in which other fluids are burned.

PUMP.—Charles Powell, Birmingham, England, now of Newton Brook, York county, Dominion of Canada.—This invention relates to certain new and useful improvements in pumps and hose and rod connections therefor.

FANNING MILL.—T. B. Kirkwood, Dublin, Ind.—This invention has for its object to improve the construction of fanning mills so that they may be simpler in construction, more effective in operation, and less expensive in manufacture, the screen shoe being no longer necessary.

WASHING MACHINE.—Alexander King and G. H. King, Painesville, Ohio.—This invention has for its object to furnish an improved washing machine, which shall be simple in construction and effective in operation, doing its work quickly and thoroughly.

SHOVEL PLOW.—Gregory Jennings, West Cairo, Ohio.—This invention has for its object to improve the construction of the shovel-plow for which letters patented No. 81,173 were granted to Aaron Jennings, August 18, 1868, so as to make it more convenient and effective in use.

COMBINED ROLLER, HARROW, AND DRILL.—Samuel Bradbury, Dresden, Mo.—This invention has for its object to furnish an improved combined harrow, roller, and drill, which shall be so constructed and arranged that the roller may be used alone, or the roller and harrow, or the roller and drill, or the roller, harrow, and drill, as the circumstances of the case may render advisable, doing its work well in either capacity.

JUMP SEATS FOR CARRIAGES.—W. H. Gregg and W. Bowe, Wilmington, Del.—This invention has for its object to improve the construction of that class of carriage seats known as "jump seats," so as to make them self-supporting, and, at the same time, strong and simple in construction, and convenient in operation.

CLOTHES FRAME.—Darwin E. Crosby and Sarah E. Strickland, South Vineland, N. J.—This invention has for its object to furnish an improved clothes frame, which shall be so constructed and arranged that ladies' dresses, and other articles that cannot be folded without being wrinkled, may be conveniently hung from it.

HAIR TRIGGER.—F. Schenck, San Antonio, Texas.—This invention relates to the arrangement of a hair trigger, of such a construction that it may be applied to any of that class of firearms which have but one notch in the hammer for the cocked position of the same. When a fly is used in the hammer it may be applied also to such arms that have a second or rest notch in the hammer.

HAIR TRIGGER.—F. Schenck, San Antonio, Texas.—This invention relates to the arrangement of a hair trigger, so complete in itself that the application of the same to any one of those firearms that have a guard and a trigger, may be effected without the slightest alteration of the interior mechanism of the gun lock, not even necessitating the application of a fly in the hammer, to prevent the catching of the trigger in the rest notch of the hammer.

MANUFACTURE OF BRICK.—Smith D. Arnold, Pittsfield, Mass.—This invention relates to a new method of preparing non-pressed brick for use, with an object of obtaining smooth fronts and tight joints.

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93,944.—MANUFACTURE OF BRICKS.—Smith D. Arnold, Pittsfield, Mass.

93,945.—TRUCK FOR STREET CARS.—Josiah Ashenfelder, Philadelphia, Pa.

93,946.—PICKER FOR WOOL, ETC.—Harris W. Axford, Richmond, Ind.

93,947.—ROCK-DRILLING APPARATUS.—Wm. F. Banks, Brookfield, Conn.

93,948.—BASE-BURNING STOVE.—M. R. Barr and William T Black, Erie, Pa.

93,949.—SCYTHE.—John F. Bartlett, Winchester, Conn.

93,950.—BUSTLE.—Myron H. Beckworth, Camden, N. Y.

93,951.—DIE FOR FORMING CARRIAGE-SHAFT SHACKLES.—Henry M. Beecher, Plantsville, Conn., assignor to H. D. Smith and Company.

93,952.—APPARATUS FOR REMOVING BENZINE FROM HYDROCARBONS.—H. J. Berg, Butler, Pa.

93,953.—DEVICE FOR SUPPORTING WAGON BEDS.—Norborne Berkeley, Aldie, Va.

93,954.—WASHING MACHINE. — George M. Bohlender, Peoria, Ill.

93,955.—TREADLE.—John B. Bolinger, Detroit, Mich.

93,956.—COMBINED HARROW, ROLLER, AND DRILL.—Samuel Bradbury, Dresden, Mo.

93,957.—ADZE.—Peter H. Bradley, Portland, Me. Antedated August 7, 1869.

93,958.—CORK-CUTTING MACHINE. — Edmund A. Brimson, New York city.

93,959.—HARROW.—Thomas Sands Brown and Thomas Archer Brown, Brooklyn, Cal.

93,960.—WINDOW-BEAD FASTENING. — George F. Brown, Winchendon, Mass.

93,961.—HEATER FOR KEROSENE LAMPS.—Willis L. Brown (assignor to himself and Samuel W. Bowen), Shelburne Falls, Mass.

93,962.—SEWING MACHINE.—Joshua H. Butterworth, Dover, N. J.

93,963.—WASHING MACHINE.—C. A. Calaway, Madison, Ohio.

93,964.—APPARATUS FOR TRANSMITTING POWER BY THE MEDIUM OF AIR.—Horace Call (assignor to himself and J. B. Rand) Concord, N. H.

93,965.—APPARATUS FOR WASHING ORES.—Wm. L. Carter, Marietta, Pa.

93,966.—MACHINE FOR MAKING POTTERY. — Andrew M. Cheeseman, Trenton, N. J.

93,967.—VELOCIPEDE.—A. Combs, Helena, Montana Territory.

93,968.—HORSE COLLAR AND HAMES.—Howard Connick, Albert Lea, Minn.

93,969.—SEEDING MACHINE.—Thomas M. Corbett (assignor to himself and John I. Herrick), Milwaukee, Wis.

93,970.—CLOTHES DRYER.—Darwin E. Crosby and Sarah E. Strickland, South Vineland, N. J.; said Sarah E. Strickland assigns her right to said Darwin E. Crosby.

93,971.—STOPPING MECHANISM FOR LOOMS.—G. K. Dearborn, Smithfield, assignor to himself and O. A. Tanner, North Providence, R. I.

93,972.—COOLING SOAP AND FORMING THE SAME INTO BARS.—Silas R. Divine, New York city. Antedated August 7, 1869.

93,973.—WAGON TIRE.—Jacob Dodder, Washington, Iowa.

93,974.—KNAPSACK ENGINE.—Joseph W. Douglas (assignor to W. B. Douglas), Middletown, Conn.

93,975.—RAILROAD CAR SPITTOON.—J. S. Du Bois, St. Louis, Mo.

93,976.—DEVICE FOR TIGHTENING WIRE FENCE.—Douglas Eaton, North Ridge, N. Y.

93,977.—GATE.—Stephen Elliott, Richmond, Ind.

93,978.—SPRING.—William Evans, Eureka, Wis.

93,979.—GATHERING ATTACHMENT FOR SEWING MACHINES.—Alfred Everiss, New York city.

93,980.—PROCESS OF PREPARING HOMEOPATHIC MEDICINES.—Bernhardt Fincke (assignor to F. Gustavus Fincke), Brooklyn, N. Y.

93,981.—CANT HOOK.—O. P. Frantz and E. Broad, St. Anthony, Minn.

93,982.—MEDICAL COMPOUND FOR TREATING THE ORGANS OF VOICE.—Francis Frisiani, New York city.

93,983.—RAILWAY CAR SPRING.—Perry G. Gardiner, New York city.

93,984.—RAILWAY CAR SPRING.—Perry G. Gardiner, New York city.

93,985.—GRAIN BINDER.—N. F. Gilman, Rochester, Minn.

93,986.—LAMP EXTINGUISHER.—Wm. Grayson and C. D. Hyndman, Odell, Ill.

93,987.—ADJUSTABLE CARRIAGE SEAT.—Wm. H. Gregg and Wm. Bowe, Wilmington, Del.

93,988.—MANUFACTURE OF RESIN AND SPIRITS OF TURPENTINE.—John F. Griffen, New York city.

93,989.—SEEDING MACHINE.—John D. Harrison, Middletown, Ohio.

93,990.—PUMP.—M. C. Hawkins, Edinborough, Pa.

93,991.—VELOCIPEDE.—James H. Haynes, Union county, Ark.

93,992.—OAR LOCK.—Henry Hempstead, Greenport, N. Y.

93,993.—ELECTRO-MAGNETIC SIGNAL APPARATUS.—George B. Hicks, Cleveland, Ohio.

93,994.—PLOW.—Leavitt Hunt, Weathersfield, Vt.

93,995.—SASH BALANCE.—S. W. Huntington, Augusta, Me.

93,996.—METALLIC WINDOW SHUTTER.—B. A. Jenkins, La Crosse, Wis.

93,997.—SHOVEL PLOW. — Gregory Jennings, West Cairo, Ohio.

93,998.—BOLT-THREADING MACHINE.—Wm. Johnson, Lambertville, N. J.

93,999.—CLOTHES DRYER.—Luther N. Johnson and Benton Silloway, Montpelier, Vt.

94,000.—QUADRANT HINGE.—Nathaniel Jones, Lockport, Ind.

94,001.—REVERSIBLE PLOW.—J. W. Jones (assignor to himself and S. H. Beckwith), Thomson, Ill.

94,002.—BUTTONHOLE AND BUCKLE.—L. A. Kettle, Philadelphia, Pa.

94,003.—REVOLVING FIRE-ARM.—Charles A. King, Springfield, Mass.

94,004.—WASHING MACHINE.—J. B. King, New York city.

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94,005.—WASHING MACHINE.—Alexander King and Geo. H. King, Painesville, Ohio.
94,006.—CURTAIN FIXTURE.—J. W. King, New York city.
94,007.—DRIVING WELL TUBES.—D. R. Knight, Akron, Ohio.
94,008.—APPARATUS FOR CLARIFYING CANE JUICE BY MEANS OF SULPHUROUS ACID GAS.—Adonis Labauve, Convent, La.
94,009.—WOODEN TRUNK.—Jacob Lagowitz, Newark, N. J.
94,010.—SLEIGH BELL.—G. W. Lamb, Cobalt, Conn.
94,011.—FLOOR CATCH FOR TABLE LEGS.—J. M. Lemon, Polk City, Iowa.
94,012.—DEVICE FOR FOLDING LETTERS, ETC.—G. W. R. Lewin, Rochester, N. Y. Antedated Aug. 7, 1869.
94,013.—MACHINE FOR REMOVING GREEN CORN FROM THE COB.—T. S. Lewis, Portland, Me.
94,014.—MAGNETO-ELECTRIC MACHINE.—Dieudonne Francois Joseph Lontin and Eardley Louis Charles d'Ivernois, Paris, France. Patented in France Dec. 14, 1868.
94,015.—STEAM ENGINE.—J. R. Maxwell and Ezra Cope, Cincinnati, Ohio.
94,016.—SHOWCASE FOR COUNTERS.—Noah Mayo and Eben S. Morse, Bath, Me.
94,017.—UMBRELLA.—Thomas McCreary (assignor to himself G. M. Sullivan, and John McCreary), Matteawan, N. Y.
94,018.—SAIL HANK.—Wm. McKay, Newburyport, Mass.
94,019.—WOOD PAVEMENT.—Antoine R. McNair, New York city.
94,020.—SPRING BED BOTTOM.—Joseph Moore, Tarentum, Pa.
94,021.—MACHINE FOR HEADING BOLTS.—David G. Morris, Catasauqua, Pa.
94,022.—SAW TEETH.—Jonah Newton, New York city.
94,023.—CLOTHES DRYER.—Geo. Oldham, Westfield, N. Y.
94,024.—SLED.—S. H. Partridge, Peterborough, N. H.
94,025.—SPRING BED BOTTOM.—Edward Perry, Hopkinton, Mass.
94,026.—PORTABLE HEATING ATTACHMENT FOR STOVES.—J. S. Perry, Albany, N. Y.
94,027.—PUMP.—Charles Powell, Birmingham, England.
94,028.—SAW SHARPENER.—George Price, Peoria county, Ill.
94,029.—APPLICATION OF CARBONATED WATERS IN MEDICINE AND SURGERY.—A. D. Puffer, Somerville, Mass.
94,030.—FABRIC FOR THE MANUFACTURE OF COLLARS, CUFFS, etc.—Jas. Restein, Philadelphia, Pa. Antedated Aug. 9, 1869.
94,031.—LAMP LIGHTER.—John Rigby, Fort Howard, Wis.
94,032.—CORN-ROW MARKER.—John Roberts, Greenfield, Ind.
94,033.—BUTTER MACHINE.—Davenport Rogers, Mount Gilead, Ohio.
94,034.—WAGON REACH AND HOUND.—W. R. Santley, New London, Ohio.
94,035.—HAIR TRIGGER.—F. Schenck, San Antonio, Texas.
94,036.—HAIR TRIGGER.—F. Schenck, San Antonio, Texas.
94,037.—INSULATOR.—Franklin Scott, Brooklyn, N. Y.
94,038.—CANT HOOK.—Peter Shults, Rockwood, N. Y.
94,039.—VELOCIPEDE.—Xavier Simon, Akron, Ohio.
94,040.—STEAM CYLINDER OILER.—S. F. Stanton, Manchester, N. H., and Orville Ripley, Charlestown, Mass.
94,041.—PLOW.—D. A. Stubblefield and W. H. Luse, Yazoo county, Miss.
94,042.—CLIP FOR ATTACHING BUCKLES.—S. G. Sturges and W. E. Sturges, Newark, N. J.
94,043.—WAFFLE IRON.—Cornelius Swartwout (assignor to himself, Joseph Foxell, Thomas Jones, and Edward W. Millard), Troy N. Y.
94,044.—HARROW.—F. Y. Tavenner, J. W. Galbraith, and Alfred Smith, Sedalia, Mo.
94,045.—MACHINE FOR CHARGING GAS RETORTS.—N. O. J. Tisdale, New Orleans, La.
94,046.—SEWING MACHINE.—S. S. Turner (assignor to himself and Willard Corney), Westborough, Mass.
94,047.—BREECH-LOADING FIRE-ARM.—S. F. Van Choate, Boston, Mass.
94,048.—HORSE RAKE AND HAY SPREADER COMBINED.—H. C. Varnum, Hartford, Vt.
94,049.—BUGGY TOP.—J. S. Wayne, Quincy, Ill.
94,050.—CORN SHELLER.—Theophilus Weaver, Harrisburg, Pa.
94,051.—SASH STOP.—M. V. B. White, Ballston, N. Y.
94,052.—FANNING MILL AND GRAIN SEPARATOR.—Darius Wilcox, Charlton, Iowa.
94,053.—PRINTERS' GALLEY.—J. Wilson, Jr., New York, assignor to himself and William Quail, Williamsburgh, N. Y.
94,054.—HOE.—J. F. Wilson, Athens, Ga.
94,055.—VELOCIPEDE.—A. M. Allen, New York city.
94,056.—VELOCIPEDE.—A. M. Allen, New York city.
94,057.—VELOCIPEDE.—A. M. Allen, New York city.
94,058.—MECHANICAL VELOCIPEDE.—Arthur M. Allen, New York city.
94,059.—PIPE COUPLING.—Matthew Andrew, Melbourne, Australia.
94,060.—FOOT WARMER.—Dinsmore Austin, Sheldon, Vt. Antedated Aug. 17, 1869.
94,061.—MACHINE FOR SAWING PAVING BLOCKS.—W. W. Ballard, Elmira, N. Y.
94,062.—WOOD PAVEMENT.—W. W. Ballard, Elmira, N. Y., and B. B. Waddell, Memphis, Tenn.; Buren B. Waddell assigns his right to W. W. Ballard.
94,063.—MODE OF CUTTING BLOCKS FOR WOOD PAVEMENT.—Wm. W. Ballard, Elmira, N. Y., and B. B. Waddell, Memphis, Tenn.; B. B. Waddell assigns all his right to W. W. Ballard.
94,064.—MANUFACTURE OF PLATED METAL BRACELETS.—John Barclay, Attleborough, Mass.
94,065.—COMBINED SEEDING MACHINE AND CULTIVATOR.—Lorenzo Bartlett, Cardington, Ohio.
94,066.—WOOD PAVEMENT.—Albert Betteley, Boston, Mass.
94,067.—CULTIVATOR.—A. C. Brinser, Middletown, Pa.
94,068.—MECHANICAL MOVEMENT.—A. W. Browne, Brooklyn, N. Y., assignor to himself and the New York Toy Manufacturing Company.
94,069.—PIPE COUPLING.—J. R. Brown, New Haven, Conn.
94,070.—TRACE BUCKLE.—J. H. H. Buell, Oriskany, N. Y.
94,071.—KNITTING MACHINE.—Frank Burns, Upper Gilmanton, N. H.
94,072.—GRINDING MILL.—Nelson Burr, Batavia, Ill.
94,073.—MANUFACTURE OF SOAP.—W. T. Bush, Obion county, Tenn.
94,074.—WATER WHEEL.—Josiah Buzby, Crosswicks, N. J.
94,075.—BASKET.—W. H. Carpenter, New York city.
94,076.—HOG ELEVATOR.—A. J. Chambers and T. Jackson, New Washington, Ohio.
94,077.—CORN PLANTER.—J. Burchard Chapman, Morrison, Ill.
94,078.—VALVE FOR PUMPS.—James Clayton, Brooklyn, N. Y.
94,079.—COMPOSITION FOR GUMMING POSTAGE AND REVENUE STAMPS.—C. L. Coombs, Washington, D. C.
94,080.—COMPOSITION OF MATTER FOR VARIOUS USES IN THE ARTS.—C. L. Coombs, Washington, D. C.
94,081.—RAILROAD CONDUCTORS' TICKET BOX AND FARE DETECTOR.—Edwin Cowles, Cleveland, Ohio.
94,082.—CLOTHES WRINGER.—Philipp Cramer, Barrington, R. I.
94,083.—RAILWAY CAR BRAKE.—J. M. Crosby, Marathon, N. Y., assignor to himself, Wm. Ballard, and Frank Livingston.
94,084.—COMPOSITION FOR COVERING STEAM BOILERS, PIPES, AND OTHER ARTICLES.—W. B. Davis, Brooklyn, N. Y.
94,085.—DUPLEX WRENCH.—A. B. Davis (assignor to himself and W. C. Ewing), Philadelphia, Pa.
94,086.—STREET CAR.—Marinus De Graff, Chicago, Ill.
94,087.—COMBINED SUPPORTER.—Solon Dike (assignor to himself and J. A. Phillips), New York city.
94,088.—LABEL FASTENER.—C. R. Doane, Brooklyn, E. D., N. Y.
94,089.—LIFTING FLATS IN SELF-STRIPPING CARDING ENGINES.—Benjamin Dobson and Wm. Slater, Bolton, England.
94,090.—HAMES FASTENER.—A. M. Dorman, Philadelphia, Pa.
94,091.—STEAM-ENGINE GOVERNOR.—C. Duclos, New Harmony, Ind.
94,092.—WASH BOILER.—J. H. Elward, Palo, Ill.
94,093.—OIL CAN.—J. G. Evans, St. Louis, Mo.
94,094.—COAL SHOVEL.—M. G. Fagan, Troy, N. Y.
94,095.—MACHINE FOR MAKING HORSESHOE NAILS.—D. J. Farmer, Wheeling, West Va. Antedated Aug. 16, 1869.
94,096.—BUREAU DRAWER.—Maurice Fitzgibbons, New York city.
94,097.—STONE-DRILLING MACHINE.—J. P. Frizell, Keokuk Iowa.
94,098.—INTERFERING PAD.—George W. Fry, Uxbridge, Mass.
94,099.—APPARATUS FOR FURLING SAILS.—E. G. Gaillic, Eastport, Me.
94,100.—CAR SPRING.—P. G. Gardiner, New York city.
94,101.—RAILWAY CAR SPRING.—P. G. Gardiner, New York city.
94,102.—SNOW PLOW FOR RAILWAYS.—C. L. Garfield, Albany, N. Y.
94,103.—GAS BURNER.—Robert Gill (assignor to E. P. Gleason), New York city.
94,104.—STEAM ENGINE.—Levi Griswold, Portland, and Geo. Caul, York, Wis.
94,105.—HAND SEED SOWER.—Geo. Hall, Morgantown, West Va.
94,106.—CULTIVATOR.—Richard Haney and James S. Estes, Peoria, Ill.
94,107.—PIPE WRENCH.—Michael Hastings, Brooklyn, N. Y.
94,108.—MUSICAL INSTRUMENT.—George Herrick, Waverly, N. Y.
94,109.—SAFETY DOOR FOR BUILDINGS.—C. Hesse, Champaign, Ill.
94,110.—BALING PRESS.—Philip Higdon, Lewisport, Ky.
94,111.—WATER WHEEL.—Otis J. Hodge, North Adams, Mass.
94,112.—SEWING MACHINE.—Geo. W. Hoffman, Hick's Mills Ill.
94,113.—MANUFACTURE OF INKSTANDS.—T. S. Hudson, East Cambridge, Mass.
94,114.—MALT KILN AND MALT HOUSE.—W. W. Hughes, Philadelphia, Pa.
94,115.—VENTILATOR.—M. T. Hynes (assignor to himself and P. J. Whelton), Boston, Mass.
94,116.—CONSTRUCTION OF HOUSES.—H. M. Irwin, Charlotte, N. C.
94,117.—MACHINE FOR PUNCHING AND SHEARING METAL.—W. H. Evens and W. E. Brooke, Trenton, N. J.
94,118.—HAND RAKE.—Daniel Johnston, Sulphur Springs, Ohio.
94,119.—TOY PISTOL.—John P. Kirk, Brooklyn, E. D., N. Y. Antedated Aug. 14, 1869.
94,120.—PHOTOGRAPHIC CAMERA STAND.—George S. Knapp, Winona, Minn.
94,121.—DIAPHRAGM FOR WASH BOILERS.—J. R. Manny, (assignor to himself and A. C. Selleck), Chicago, Ill.
94,122.—MACHINE FOR MAKING BOLT HEADS.—M. D. Marcy, Worcester, Mass.
94,123.—VEGETABLE CUTTER.—Solomon Metzger, Newberry, Pa.
94,124.—FENCE POST.—W. A. Middleton, Harrisburg, Pa.
94,125.—GARDEN IMPLEMENT.—Henry Miller, Roadside, Va.
94,126.—WAGON REACH.—J. H. Moffett, Reading, Mich.
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94,129.—WASH BOILER.—Nathaniel Parks, Mohawk, N. Y.
94,130.—MACHINE FOR TURNING OVALS.—Paul Pryibil, New York city.
94,131.—MANUFACTURE OF PAPER.—J. B. Read, Tuscaloosa, Ala. Antedated, August 17, 1869.
94,132.—WATER METER.—T. D. Read and L. M. Ellis, Aberdeen, Ind.
94,133.—GANG PLOW.—F. F. Reynolds, Bethany, Ga.
94,134.—BOOT AND SHOE SEWING MACHINE.—E. P. Richardson, Lawrence, Mass.
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94,161.—WRENCH.—W. A. Wilson, Savannah, Mo.
94,162.—WATER WHEEL.—A. N. Wolf, Mill Creek township, and Joel Haag, Bernville, Pa.
94,163.—MACHINE FOR POLISHING SPOKES.—J. V. Woolsey, Sandusky, Ohio.
94,164.—SPOKE TENONING MACHINE.—J. V. Woolsey, Sandusky, Ohio.
94,165.—WASH BOILER.—E. M. Wright, Castile, N. Y., assigns one half to Gardner Herrick, Albion, Mich.
94,166.—CLOTH TENTERING AND DRYING MACHINE.—Andre Avery, Worcester, Mass.
94,167.—HARVESTER.—Alzirus Brown, Worcester, Mass.
94,168.—VEHICLE FOR CARRYING MAIL.—D. D. Foley, Washington, D. C.
94,169.—PROPAGATING BOX FOR PLANTS.—Clark Jillson, Worcester, Mass.

REISSUES.

87,617.—WASHING MACHINE.—Dated March 9, 1869; reissue 3,613.—T. Bailey and V. W. Blanchard, Bridport, Vt.
31,348.—SKATE.—Dated Feb. 5, 1861; reissue 3,614.—J. F. Calhoun, Wolcottville, Conn., assignee, by mesne assignment of P. J. Clark.
78,872.—SUSPENDERS.—Dated June 16, 1868; reissue, 3,615.—Alexander Wimbish Harris, New York city.
91,657.—SUBSOIL PLOW.—Dated June 22, 1869; reissue 3,616.—James W. Murfee, Havana, Ala.
12,723.—MACHINE FOR PUNCHING METAL.—Dated April 17, 1855; extended seven years; reissue 3,617.—Charles Parker, Meriden, Conn., assignee of George Fowler and the administrators of the estate of De Grasse Fowler, deceased, viz., Maltby and Sophronia Fowler.
44,561.—FEED-WATER HEATER AND FILTERER.—Dated October 4, 1864; reissue 2,159; dated January 23, 1866; reissue 3,618.—Edwin R. Stilwell, Dayton, Ohio.
89,211.—MACHINE FOR HEADING BOLTS.—Dated April 20, 1869; reissue 3,619.—C. H. Emerson and John F. Emerson, New York city.
63,300.—PROCESS OF PRESERVING WOOD AND TIMBER.—Dated March 26, 1867; reissue 3,620.—Daniel R. Prindle, East Bethany, N. Y.
23,267.—WATER WHEEL.—Dated March 15, 1859; reissue 918, dated Feb. 28, 1860; reissue 3,621; P. H. Roots (assignor to himself and F. M. Roots), Connersville, Ind.

DESIGN.

3,638.—SLEIGH.—James Nelson and Harmon G. Ellsworth, Lockport, N. Y.

EXTENSION.

MAKING ZINC WHITE.—John E. Burrows, Newark, N. J.—Letters Patent No. 13,416, dated August 14, 1855.

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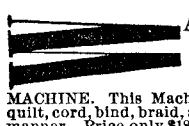

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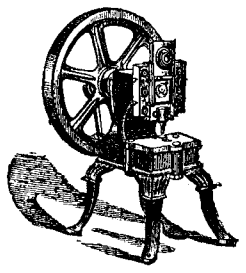

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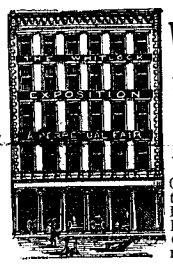

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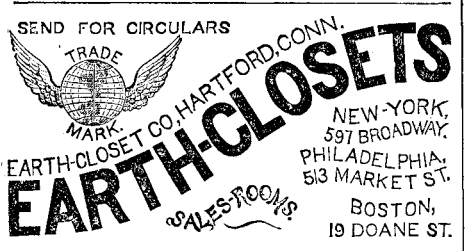

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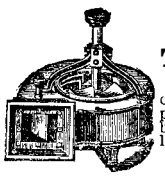

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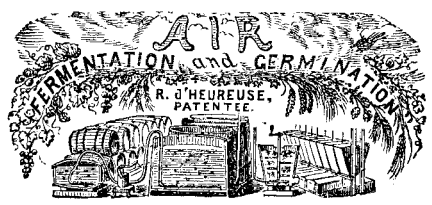

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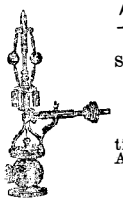

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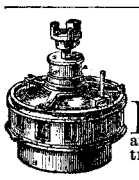

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